



Mergers and Acquisitions: The Roche's offer for Illumina

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Abstract

As of January 2012, the Swiss drug maker Roche made a hostile offer of \$44,50 USD per share of Illumina, a biotechnology company based in the US. This move has been following a consolidating strategy from Roche that acquires small and mid-sized companies which will allow its business to develop. The beginning of the negotiations was coincident with the beginning of this dissertation and it captured the writer's attention to evaluate such deal.

Throughout this dissertation, there is a review of literature regarding several topics on valuation and M&A, followed by an analysis of both companies and their respective industries. One of the most important chapters is related to the companies' valuations and the assessment of potential synergies from the deal. An offer price is suggested along with an offer structure.

Illumina's market cap is valued at \$5,7 bn, representing an upside potential of 35% against the figures of the last trading day of 2011. Synergies are estimated to be of \$3,3 bn, mostly due to Roche's capability to launch personalised medicines, as well as its capability to incorporate Illumina's operations and make it more efficient. An offer price of \$56,47 is suggested with a deal 100% financed with debt, so that most of the value added is received by Roche's shareholders.

By the time this thesis was delivered, there was still no agreement between both companies in order to close the deal and Illumina asked for \$75 per share in the last negotiation, which Roche rejected.

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1. Introduction

As of January 2012, the Swiss drug maker Roche made a hostile offer of \$44,50 USD per share of Illumina, a biotechnology company based in the US. This move has been following a consolidating strategy from Roche that acquires small and mid-sized companies which will allow its business to develop. As stated in Roche's latest annual report, "Our goal is to lead through innovations in science by combining the critical mass of Big Pharma with the flexibility and entrepreneurial spirit of smaller business units". The special interest in Illumina is related with its gene sequencing technology that would allow Roche to develop state-of-the-art therapies, customised for each patient.

Since the negotiations would occur during the development of this dissertation, it seemed appealing to explore this deal. As a cross-border acquisition, it was also a good way to perform a more interesting analysis. Moreover, As Roche and Illumina are at two different stages in their life-cycle, two different perspectives would have to be considered for the valuation assumptions. Lack of information, especially from such a recent company as Illumina was one of the challenges, as well as the complexity of the healthcare industry.

After several rounds of negotiation and considerable speculation, Illumina consistently rejected Roche's offer – \$51 USD per share was the final offer in April, totalling a \$7 billion deal. By the end of December the deal resurfaced with Illumina asking for a price of \$75 per share, which Roche rejected.

In this dissertation, both companies will be valued, potential synergies will be accounted and an offer price will be proposed. These figures will then be compared with Roche's offer, in order to ascertain whether it was a good move on the part of Illumina to reject the deal or if, on the other hand, Roche acted well in its decision to walk away and not raise the price above \$51 USD.

The literature review section presents an overview of the academic perspective on company valuation and mergers and acquisitions. This chapter is important to understand which are considered the best practices, in order to reach a valuation and to build up an acquisition strategy that is as accurate as possible.

Relying on available data, an industry and both companies' analysis are performed. This section sums up relevant financial data to be considered when assumptions about the companies have to be made in the valuation section. Both companies will be valued at a point in time before the announcement of the offer (standalone valuation) and then the merged entity will be valued, subsequently incorporating the possible synergies. A strategy for the acquisition has to be built and it is important to assess which players would benefit from such a deal.

Finally, a comparison with reality is undertaken, in order to understand why the deal did not take place so far. It is important to mention that, no matter how deep the analysis performed and how detailed the forecasts are, it is impossible to reach an exact, 100% accurate value, since guessing the future is not possible and many factors may change and lead to different results in the years to come. Above all, the most important thing is to exercise a logical rationale that would fit the best practices to analyse such deals.

2. Literature Review

In this chapter, several academic aspects regarding M&A and Company Valuation will be addressed. By analysing different academic studies, one can find information to help decide which valuation method is more appropriate in each case or which risk premium should be considered in a cross-border deal. In the following pages, the relevant literature for this thesis will be addressed, additionally considering some alternatives and points of discussion that although are not applicable for the case, are worthy of mention.

2.1. Literature on Mergers and Acquisitions

2.1.1. Types of M&A

There are different classifications to identify types of M&A. For instance, Ross et. al (2003) mention two different ways to categorize M&As – *legal procedures* and the *typical financial analysts' classification*.

Within the *legal procedures*, there are three distinct deals:

- Merger or Consolidation – In a merger, the buyer absorbs the target company, acquiring all the assets and liabilities and through a consolidation, a new firm is created, aggregating both companies, leading to a new legal entity. Both types of deals need the approval of the involved companies' stockholders, generally, by a favourable vote from, at least, two-thirds of the total shares.
- Acquisition of Stock – The acquirer makes an offer for the target's stocks. Usually, this operation is performed through a tender offer, i.e. buying the target's shares making a public offer for the shareholders of that firm. A general meeting is not necessary since the buyer deals directly with the shareholders. However, it may be difficult to buy the entire company as it is up to each and every shareholder's decision whether to sell the shares or not.
- Acquisition of Assets – The bidding company buys all the assets from the target. It requires a formal approval from the shareholders and transferring the ownership of those assets may be costly.

According to the *typical financial analysts' classification*, the deals are characterized as follows:

- Horizontal Acquisition – Both the bidding and the target companies are from the same industry, competing in their product market.
- Vertical Acquisition – The firms are from a different stage in the production process. One can take as an example the acquisition of a travel agency by an airline company.
- Conglomerate Acquisition – The companies involved in the deal are not related at all, being from different industries.

Damodaran (2002) presents a classification similar to the above mentioned *legal procedures* type and he adds another classification for a deal when it is not a company acquiring a second one, but instead, a company is acquired by its own management team (Management Buyout) or by a group of investors, usually making the acquisition with a high level of debt (Leverage Buyout).

2.1.2. One Plus One Equals Three – The Reasoning for M&As

There are different motives for companies to engage in M&A deals. Some of the most commonly mentioned across academic papers are the acquisition of undervalued companies, diversification by buying firms from other businesses, synergies (operating and/or financial), the acquisition of badly managed companies or even just for managerial self-interest. Bower (2001) outlines distinct strategic objectives and major concerns regarding the different reasons for M&A deals. Either by an attempt to deal with overcapacity or by a roll-up of local competitors, the bidder is looking for growth and market share. One should be concerned with the problems that may arise from such deals. Through the aggregation of several companies, there may be a conflict in terms of culture or operations. Usually, there is a rationalization of costs and the acquired company's employees are more affected by the layoffs. If the deal is a merger of equals (companies of roughly the same size), there may be strong arguments for cost cutting decisions, which values to implement, how to manage organizational culture conflicts and, especially, who will take management control.

Another interesting perspective is the acquisition of companies as a substitute for R&D or to exploit a new industry that is likely to become important in the market. These strategies would imply entering into new fields but could also be a source of diversification for the company, thus diminishing the company's risk. As for the substitution for R&D, the company may be acquiring some start-ups in the same industry. As far as main issues that may arise are concerned, these are related with cultural aspects and being able to provide the freedom that is necessary for the creative process. When it concerns a strategic shift towards other industries, management should focus their efforts on due diligence and ensure that they understand the new market that will be addressed.

There may be other less financial aspects such as testimonials and success stories that may influence managers towards this type of deal. Kummer and Steger (2008) performed a study on M&A waves and they mention that "Testimonial evidence about businesses at conferences and in the media tells us that some M&A have (supposedly) been a huge success" but "...when these success stories are examined in detail, it is often difficult to measure whether they really were successful." Companies also suffer external pressures for growth, especially those that are listed. When there are no more sources of internal growth, M&A can present itself as a viable strategy to continue expansion. Also, some managers have the self-interest to become emperors in the industry and make as many acquisitions as possible in a show of power.

Goedhart et. al (2010) identify five types of successful acquisitions, namely those that improve the performance of the target company, consolidate companies in the industry in order to remove excess capacity,

buying small companies either to provide them with easier market access, to take advantage of their skills or technologies or simply by betting on future winners in the market. Again, some of these deals are surrounded by a lot of uncertainty and therefore, one should develop a well-planned strategy for value creation. The authors also refer to a roll-up strategy or buying undervalued companies as strategies that may not lead to value creation. The first is easily copied by competitors and the second is not simple to spot, since the company would need to be evaluating the target with better precision than the market.

2.1.3. The Power of Synergies

When several CFOs in the United States were asked about their reasons for M&A deals, a large majority mentioned synergies (37,3%) and diversification (29,3%) as the principal motives. In order to understand such preponderance of this reason for an acquisition, one should start by understanding the meaning of this concept. “Synergy is the additional value that is generated by combining two firms, creating opportunities that would not have been available to these firms operating independently” as Damodaran (2005) considers. In the same working paper, the author categorizes different types of synergies:

- Operating Synergies – these will generally lead to higher expected cash flows for the company and can be materialized through *economies of scale* achieving cost-efficiency, *greater pricing power* by reducing competition, *combination of different functional strengths* or *higher growth in new existing markets*, mostly in cross-border mergers.
- Financial Synergies – these can either lead to higher expected cash flows or lowering the discount rate at which the companies are valued. These synergies can be achieved through the combination of a company with *excess cash* but narrowed growth opportunities with a company with *highly profitable projects* but limited cash. Increase the company’s *debt capacity* and benefit from *tax savings* are other reasons. Finally, *diversification* (which is the second reason presented in the survey above mentioned) is also subject of financial synergy as it may lower the discount rate.

But while, managers rely on synergies to justify acquisitions, there is a lot of uncertainty as to whether they actually materialize. Reasons such as exploring new markets or combining functional strengths are so intangible that they should not be considered, once *a priori*, they cannot be reflected into currency. Moreover, one should not only account for the benefits from potential synergies but also consider the costs the company would incur to achieve them. Ficery et. al (2007) identify six common mistakes related with synergies, the most relevant being the incorrect definition of synergies, either too narrow or too broad and missing the window of opportunity to achieve those synergies, since around three quarters of the value captured from synergies occurs during the first year after the deal, thus there should be a special focus on the first years to capture all the added value that was suggested.

2.1.4. Cross-Border M&A

With the increased globalization of markets, labour, capital, goods and services are easier to trade. This facilitates investments abroad and companies look for growth, especially in emerging markets where there are attractive opportunities to grow the business. Zenner et. al (2008) identify long and short-term drivers for cross-border M&A as well as possible factors that might reduce this trend. Globalization and geographical diversification increase scale for the firm and afford the opportunity to explore new markets. The trend towards deregulation and the consequent free flow of capital and goods also prospers this trend to look for external markets. From a short-term perspective, high relative equity valuation of target companies predicts growth potential. The authors also mentioned that the weakness of USD makes US-based companies less valuable and investing abroad can reduce that risk. Moreover, sovereign wealth funds have gained relevance in the market and major investments are made overseas in order to offset possible adverse cycles affecting the country. As an example we can take the recent set of investments made by the Chinese Government in companies based in several different countries. However, these short-term factors can change without notice and alter the context in which such deals are made. Also, one should take protectionism laws of the foreign country into account. This issue is especially relevant in emerging markets, where there is a higher degree of uncertainty.

In terms of valuation, it is important to take into account some aspects that may differ due to the nature of a cross-border deal. Froot (1997) refers some aspects such as:

- Taxes – countries have different corporate tax rates and regimes. Using the higher corporate tax rate is assumed to be a good conservative assumption. Also, it is important to analyse whether the foreign country offers any type of tax exemptions for international investments and thus account for any effect this might have during the relevant period.
- Different Currencies – a cross-border deal may occur with two firms that operate in different currencies. In order to make the valuation one can estimate in the foreign currency FCFF, convert to the domestic currency and obtain the firm value by discounting with a home currency discount rate, accounting for the necessary risk adjustments (country, asset and financial risks). Alternatively, the entire valuation can be performed in the foreign currency. Cash flows, respective discount rate and the final result will then be converted to the domestic currency using a spot foreign exchange rate. Zenner et. al (2008) also present these alternatives and both methods lead to the same result.
- Adjusting the valuation for possible additional risk in the foreign country, such as expropriation or inflation risk for instance. This can be achieved by either adding a risk premium to the discount rate (this would assume that this risk is constant over time) or by accounting for these potential risks in the cash flow forecasts. Performing a scenario analysis is also a good practice to analyse these effects.

Chari et. al (2010) analysed acquirer returns three days either side of the announcement day of the deal for developed-market acquirer and emerging-market targets between 1986 and 2006 and concluded that, on average, there is a statistically significant increase of 1,16% in acquirer's returns compared to developed-market acquirer and target deals.

Although this dissertation analyses a cross-border deal, both companies are based in developed markets, therefore some of the considerations above stated will not be addressed, as for instance, there may be a lower risk exposure due to a lower level of uncertainty.

2.1.5. Methods of Payment and Their Implications

Two common methods of payment can be identified: common stock exchange or cash offers. There is a general agreement in academia regarding the implications of selecting either one of the methods. Usually, mergers are paid for through common stock exchange, while tender offers are transacted with cash, as Travlos (1987) stated in his work. The same author concludes that, upon announcement, the shareholders' returns on the bidding firm suffer significant losses while cash offer deals do not lead to abnormal rates of return (either positive or negative). A recent study by Hazelkorn et. al (2004) lead to the same conclusion. Moreover, the authors pointed out that in the long term (over a two-year period) "cash-financed acquirers outperformed industry peers by 4,3% while stock-financed acquirers underperformed industry peers by 5,2%".

Both articles mention the signalling effect of the payment methods. An equity-financed transaction tends to signal overpriced stocks. Also, if the transaction is paid through exchange of stocks, the target company's shareholders will not only capture the risk of the deal but also, the potential synergies. If the management is certain about the future gains, there is no incentive to share it with other shareholders. On the other hand, a cash offer sends positive signals to the market, since it represents the acquirer's confidence in re-establishing the cash balance as well as confining all the potential gains from the deal to the existing shareholders.

Martynova and Renneboog (2009) consider the acquirer's financing decision to be driven by the cost of capital and the company will seek the cheapest way of financing and structuring the method of payment taking that into consideration. When there is a cash offer, especially financed through debt, managers tend to have more incentives to benefit from synergies earlier, as it is crucial to repay debt.

2.2. Literature on Valuation

2.2.1. Valuation Techniques

There are several valuation methods that one can use to obtain the value of a company or investment. Damodaran (2002) provides a classification of different approaches to valuation and they are presented as such:

- Discounted Cash Flow (DCF) Valuation – Based on the Present Value of an asset or its expected future cash flows. The type of cash flows to be used and the discount rate to be applied are the main differentiators of the different models within this category. Examples:
 - Equity Valuation – discounting expected Free Cash Flows to Equity at the cost of Equity.
 - Firm Valuation – discounting expected Free Cash Flows to the Firm at the weighted average cost of capital (WACC) or using the Adjusted Present Value (APV), which is a sum of two components: the firm value as if the company was only equity financed plus the present value of tax shields.
- Relative Valuation – Valuation of an asset comparing it with similar assets in terms of a variable as, for instance, cash flows, earnings, sales or book value. Examples:
 - Price to Cash Flow, Price to Earnings Ratio, Price to Sales, Price to Book Value, Price to Dividend Yield.
- Contingent Claim Valuation – Valuation of assets with such characteristics that one can apply the option pricing models. As an example, an oil company can value the option to explore an undeveloped oil reserve. The options vary from firm to firm and it can be applied to either financial or real assets. These options can be valued through the Black and Scholes Model or the Binomial Option Pricing Model.

Young et. al (1999) compared distinct valuation methods and assumed that it is indifferent which model is used as they should all lead to similar values. The authors state that it is possible to identify the assumptions that make the value of a company change from one method to another.

2.2.2. Discounting Cash Flow Valuation

2.2.2.1. Equity Valuation

This model gives the equity value of a firm. It is based on free cash flows to equity (FCFE), which can be seen as the cash flows that the firm can afford to distribute to its shareholders after all the financial obligations, capital expenditures and working capital needs are met. As Koller et. al (2005) state, there is a second way to

compute free cash flows to equity as “dividends plus share repurchases minus new equity issues”, leading to similar values.

It is important to mention that dividends and free cash flows to equity may not be the same. The FCFE represent the cash available to be paid out to stockholders but the firm may be paying more or less dividends to its shareholders. Damodaran (2002) identifies desire for stability in dividends payment, future investment needs and increases in dividends payments as positive signalling effects and likewise, reasons why FCFE and dividends tend to be different in value. Actually, investors expect to have increasing dividend payments over the years. As this dividends policy may influence the analysis of the equity value, using the Dividend Discount Model may be misleading.

2.2.2.2. Firm Valuation using WACC and APV

These two models discount Free Cash Flows to the Firm (FCFF) to their present value but at different discount rates. The FCFF is defined as the sum of cash available to repay all claim holders. Luehrman (1997) provides an example on how to compute the FCFF. In general terms, FCFF is given by EBIT (1- Corporate Tax Rate) plus Depreciation, minus Capital Expenditure, minus Changes in Net Working Capital.

The same author compares the two alternatives to reach the enterprise value. In the WACC-based method, the cash flows are discounted at a weighted average cost of capital (WACC), which incorporates all the financial effects, namely any benefits or costs related with the leverage in the capital structure of the firm. The major drawback of this method is that either the firm has a stable capital structure, or one needs to compute a new discount rate, i.e. a new WACC every period the capital structure is changed, which may be challenging. The formula to compute the WACC is given by:

$$WACC = \frac{D}{V} k_D (1 - tax\ rate) + \frac{E}{V} k_E$$

This way, the portion of debt will be discounted at a cost of debt, accounting also for the tax shields, while the portion of equity will be discounted at the cost of equity.

On the other hand, the APV method consists of the sum of two components: the valuation of the firm as if it was all equity financed, therefore discounting the FCFF at an unlevered cost of capital plus the value of interest tax shields discounted at the cost of debt. In the article, APV is said to be a better tool as it works even when the WACC method cannot be applied. Also, for managerial decisions, APV is richer in information, since the financial effects can be clearly identified from the value of the project/assets of the company itself. This allows managers to understand where value comes from.

2.2.3. Relative Valuation

With this method, a company is valued through a comparison with other similar firms in the market. Damodaran (2002) states that it is necessary to have standardized prices, as it is not possible to simply compare share prices, since companies have different number of shares. Thus, “converting prices into multiples of earnings, book values or sales” is an option to overcome this bias. Goedhart et. al (2005) affirm that performing this comparison with other firms in the market is a good reality check for the necessary assumptions for the forecasting period in the DCF approaches. When there are significant differences in those assumptions, it is possible to verify if either the companies indeed have different performances or if the assumptions are incorrect.

One can compute several multiples as for instance Price to Earnings Ratio, Price to Book Value and Enterprise Value to Sales. One can either estimate the market value of the assets of the firm or the equity value, depending on whether we use price or enterprise value multiples.

The multiples are straightforward and simple to calculate and the value of the company can therefore be easily derived. The main challenge however, is to identify which companies in the market are comparable with the one being valued, i.e. defining the peer group. Kaplan and Ruback (1996) point out three different measures to determine the peer group: *comparable company*, where the multiple is “calculated from the trading values of firms in the same industry as the firm being valued”; *comparable transaction* having multiples “from companies that were involved in a similar transaction” and *comparable industry transaction*, which comprises of multiples of firms from the same industry with similar transactions. Goedhart et. al (2005) suggest the use of companies with “similar expectations for growth and ROIC”.

Liu et. al (2002) provide a ranking of the multiples regarding their proximity to stock prices. They conclude that the multiples with bigger explanatory power are the ones based on forward earnings, historical earnings and cash flow measures. When deciding on the multiples to estimate the value of Roche and Illumina, these will certainly be taken into account.

Kaplan and Ruback (1996) compare multiples valuation with the discounted cash flow methods and conclude that the DCF approaches perform better. However, the DCF approach would gain explanatory power when combined with the information provided by the multiples valuation.

2.2.4. Contingent Claim Valuation

Through the application of real options, managers can assess whether implementing a new project will be profitable and if so, the appropriate timing. Copeland and Keenan (1998) identify several sectors where real options can be applied, one of which is the pharmaceutical industry. Real options may be useful to value R&D projects and define which ones should be applied first. R&D is surrounded by technological uncertainty (whether or not the outcome will lead to a new product) as well as market uncertainty (whether or not there will be demand for that new product). The authors, however, maintain that attempts to apply real options are still too

simplistic to provide relevant results. Nevertheless, in a strategic sense, this is a good method to understand the uncertainties faced by the firms when deciding to embrace new projects.

2.2.5. Putting It to Practice

When developing the deal valuation, some estimates will need to be made. In this section of the Literature Review, the major issues for estimating cash flows and computing the discount rates necessary for the valuation of the Roche & Illumina deal will be addressed.

2.2.5.1. Estimating CF

In order to use the WACC and APV methods, it is necessary to first calculate the Free Cash Flows to the Firm (FCFF), as already mentioned. The formula to calculate it is as follows:

$$FCFF = EBIT(1 - tax\ rate) + Depreciation - Capital\ Expenditure - \Delta Working\ Capital$$

The cash flows are computed each year while the company's performance varies. After a few years (three to ten years in general), the steady state is assumed and FCFF are assumed to be a perpetuity with or without a certain yearly growth rate. This final year of estimation is called the Terminal Value and is given by:

$$Terminal\ Value = \frac{FCFF_{TV}}{Discount\ Rate - Growth\ Rate}$$

Young et. al (1999) consider terminal value to be "by far the most important element in any valuation estimate". In fact, as the explicit period (first years of estimates) represents only few years, at the end, terminal value will represent about 80% to 90% of the market value estimate. Regarding the terminal value, expected growth can be estimated by multiplying the firm's reinvestment rate by the return on capital as Damodaran (2002) states. Moreover, Kaplan and Ruback (1996) assume that in the terminal value period capital expenditures (CAPEX) should be at least as large as depreciation and amortization, once it is assumed to be a growing perpetuity.

As this dissertation is based on a cross-border deal, special factors are to be taken into account. The firms have their accounts in two different currencies and the tax rates are different. These issues were already addressed in the Cross-Border M&A section.

2.2.5.2. Compute the Discount Rates

Once the cash flows are computed, the next step is to obtain the present value of the firm. In order to do so, it is necessary to use a suitable discount rate. This rate will depend on the valuation method that is used. As for the WACC method, one must compute the cost of equity (levered) and the cost of debt. For the APV methodology, the unlevered cost of equity and the cost of debt are necessary.

➤ Cost of Equity

There are several asset-pricing models useful to estimate the cost of equity of a firm. These models determine the expected return on a company's stock that would compensate the risk assumed by the investor. Koller et. al (2005) identify three models as the most commonly used – Capital Asset Pricing Model (CAPM), Fama-French Three-Factor Model and Arbitrage Pricing Theory (APT).

CAPM

This model was first developed by William Sharpe in 1964. The author outlines that an investor will demand a return that represents the sum of the return on a risk-free rate plus an additional premium to compensate for the risk exposure. "In effect, the market presents him [the investor] with two prices: the *price of time*, or the pure interest rate and the *price of risk*, the expected return per unit of risk borne" mentioned Sharpe (1964).

The cost of equity can be computed as:

$$E(R_i) = r_f + \beta_i[E(R_m) - r_f]$$

Where:

$E(R_i)$ – Expected return on a stock of company i.

r_f – Risk-free rate.

β_i – Beta of company i – stock's covariance with the market.

$E(R_m)$ – Expected return on the market index.

Moreover, the difference between the expected return on the market index and the risk-free rate ($E(R_m) - r_f$) represents the Equity Risk Premium. It can be seen as the outperformance of risky assets over a risk-free asset, leading again to the idea of a premium to compensate for risk.

Therefore, one needs to determine the risk-free rate, the beta for the company and the equity risk premium in order to come up with an estimate for the cost of equity.

- Risk-free rate – to estimate the r_f , the common practice is to consider government bonds with no default risk. Koller et. al (2005) identify the 10-year US government bond as a good proxy for the risk-free rate in the valuation of US based companies, while the 10-year German Eurobond is

suggested for the valuation of European companies. In the case of this thesis, the 10-year Swiss government bond can be used to value Roche, since this asset is also stable and riskless.

- Beta – in order to compute the beta, a regression of the stock's returns against the market's returns is performed. Beta is given by the covariance between the firm and the market. According to Koller et. al (2005), "company stock returns should be regressed against a value-weighted, well diversified portfolio, such as the S&P 500 or MSCI World Index". In order to improve the beta estimate, one should look at the betas for similar companies in the same industry. When computing the beta, the effect of the company's leverage is incorporated. One can determine the unlevered beta (accounting only for operating risks) with the following relationship:

$$\beta_L = \beta_U \left(1 + \frac{D}{E} \times (1 - \text{tax rate}) \right)$$

As a final consideration, depending on the valuation method, the levered (WACC) or unlevered (APV) cost of equity will be computed. In order to do so, it is necessary to match the cost of equity with the corresponding beta, i.e. for levered cost of equity, one must use the levered beta and the same applies for the unlevered.

- Equity Risk Premium – There are several methods to estimate the Equity Risk Premium. Damadoran (2012) identify three common practices: obtain the market expectations by surveying investors and managers; use the historical premium as a proxy for the future; estimate an implied premium by looking at the market rates and prices on the assets today. The author suggests that the best approach for valuation is to use the implied equity risk premium, since this was the approach with the best predictive power. As already mentioned in the Cross-border M&A topic, one should account for an additional country risk premium when considering less stable markets. Moreover, when valuing a global company, one can use a global equity index as for instance the Morgan Stanley Capital Index (MSCI) to determine the Equity Risk Premium.

Fama-French Three-Factor Model and APT

Fama and French (1996) presented a model that is able to overcome some anomalies in the CAPM. According to the authors, "average returns on common stocks are related to firm characteristics like size, earnings/price, cash flow/price, book-to-market equity, past sales growth, long-term past return, and short-term past return". The Three-Factor model is given by the following regression:

$$R_i - r_f = \alpha_i + b_i(R_M - r_f) + s_iSMB + h_iHML + \varepsilon_i$$

Where SMB and HML correspond to the difference between the return on two portfolios, respectively, small stocks minus big stocks (SMB) and high book-to-market stocks minus low book-to-market stocks (HML). The first factor is the equity risk premium as already seen in the CAPM model.

The APT can be seen as a generalized version of the Fama-French model. Generally, the logic applied is similar, but this model has k factors, as much as the considered relevant to determine the excess return on a company's stocks. Koller et. al (2005) consider this model to be too theoretical and of difficult implementation as "there is little agreement about how many factors there are, what the factors represent, or how to measure the factors".

➤ Cost of Debt

A good proxy for the cost of debt of a firm is its yield to maturity on long-term, highly liquid, option-free bonds (Koller et. al 2005). However, this rate is a promised rate and thus it may not be the most suitable one to discount expected cash flows. The authors state that this proxy is applicable for companies with an investment-grade debt of BBB or better.

In other situations, one should use the bond ratings provided by the rating agencies, as for instance S&P or Moody's and add up the respective spread to the risk-free rate. Damodaran (2002) provides a third perspective where the interest coverage ratio (EBIT/Interest Expenses) of the firm is computed and compared with the ratios of rated firms, applying a spread based on the spread of those firms.

3. Roche, Illumina and Industry Review

3.1. Roche

Fritz Hoffmann-La Roche founded the company in 1896 with the same vision that guides Roche today – manufacturing high quality drugs and to distribute them internationally. By 1912, Roche had already expanded its business on three continents, across nine different countries. Currently, Roche operates in more than 150 countries. The company has been growing through several acquisitions of innovative companies that, through time, allowed Roche to develop its products and being in the edge of innovation. Roche employs around 80,000 people worldwide.

The company’s operations can be segmented into two different areas: pharmaceuticals and diagnostics. Within each area there are smaller divisions, being the pharmaceuticals area divided into three fields: Roche Pharmaceuticals, Genentech and Chugai; and the diagnostics area has five distinct fields: Applied Science, Diabetes Care, Molecular Diagnostics, Tissue Diagnosis and Professional Diagnostics. In general terms, Roche is a producer and developer of drugs for the treatment of several diseases and it also develops diagnostic instruments for the detection, prevention and treatment of patients. In terms of R&D, the company focuses its efforts in therapeutic areas such as oncology, virology, inflammation, metabolic disorders, and central nervous system. Roche has its operations spread worldwide. According to each segment there is a different division as it is possible to see in the charts below.

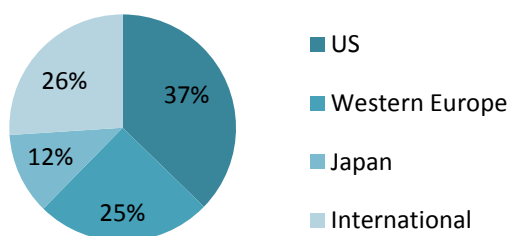


Fig.1 - Pharmaceuticals - % Sales by Region (2011)

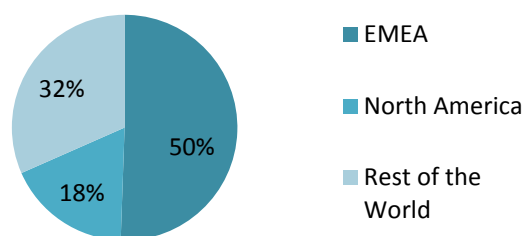


Fig.2 - Diagnostics - % Sales by Region (2011)

The North American and European markets are at utmost importance for the company. As a matter of fact, 37% of the Pharmaceuticals Segment Sales are for the US market followed by Western Europe (Fig.1). For the Diagnostics Segment Sales, 50% of sales are for the EMEA (Europe, the Middle East and Africa) market (Fig.2).

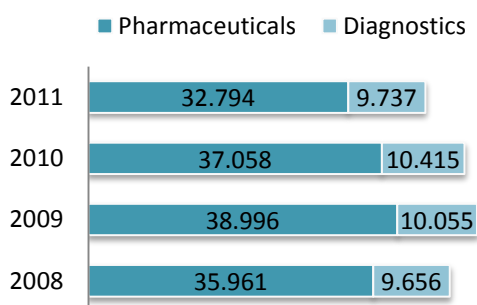
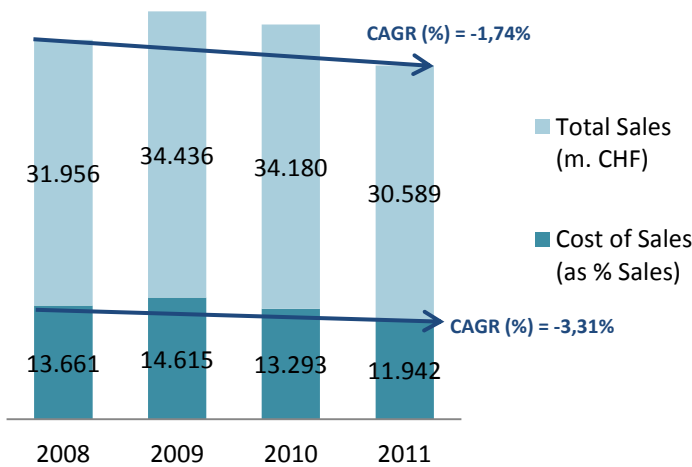


Fig.3 - Sales by Segment (m. CHF)

Since 2009, the total amount of sales has declined being this value equal to 42.531 million CHF in 2011 (Fig.3). This represents a 10% decrease when comparing with the 47.473 million CHF in 2010, which was already reflecting a 3% decline from the 2009 amount. For this 4-year period, the CAGR was equal to -1.74%. The Diagnostics segment has been gaining

relevance in the total business, increasing its weight on total sales from 20,5% in 2009 to 22,9% in 2011.

Fig.4 - Evolution of Sales and Cost of Sales



Another important issue is the fact that the cost of sales has been falling through time (Fig.4). One of the factors leading to this reduction is the decrease in royalties payments, which expire through time. Nevertheless, when looking at the company's annual report, it is stated that sales actually grew 1% at Constant Exchange Rates, however as the Swiss Franc has been strengthening against other currencies, it impacted severely the results. When comparing cost of Sales relatively to total sales, the ratio has been quite stable, albeit with a decreasing trend.

In this account, there is no impact of exchange rates, mostly because Roche has the majority of its cost base allocated outside Switzerland.

3.2. Illumina

Illumina was founded in 1998 by David Walt, Larry Bock, John Stuelpnagel, Anthony Czarnik, Mark Chee – a group of scientific experts and venture capital investors. The company went public in 2000. This innovative company offers products and services for the analysis of genetic variation and function. In 2002, Illumina launched its first system – Illumina BeadLab. In 2007, it was named the fastest growing high-tech company by Forbes. Currently, its portfolio has more than 10 instruments and assays available to address state of the art disease research, drugs development, molecular tests and genetics analysis.

Illumina's operations are divided in two segments: Life Sciences and Diagnostics. The Life Sciences segment comprises all products and services related with the research market, while the Diagnostics segment explores the molecular diagnostics field. So far, the Diagnostics segment represented a very small percentage of the operations and the company presents its results as a whole. According to the company's most recent annual report (2012), the results of the operations will be reported in two segments once the Diagnostics segment represents more than 10% of revenues, operating profit or loss, or assets of the total business.

The company sells its products and services in North America, Europe and Asia-Pacific regions, its customers in general are academic and government research centres, pharmaceutical and biotechnology companies. As of the beginning of 2012, the company employed around 2,200 people.

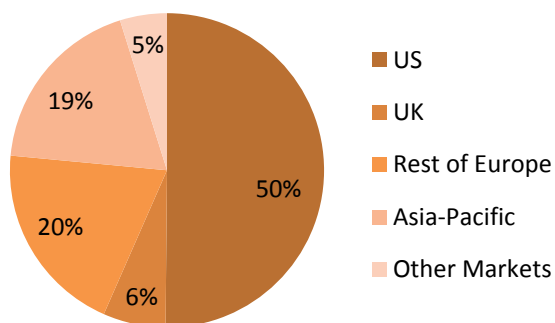


Fig.5 - Sales by Region (2011)

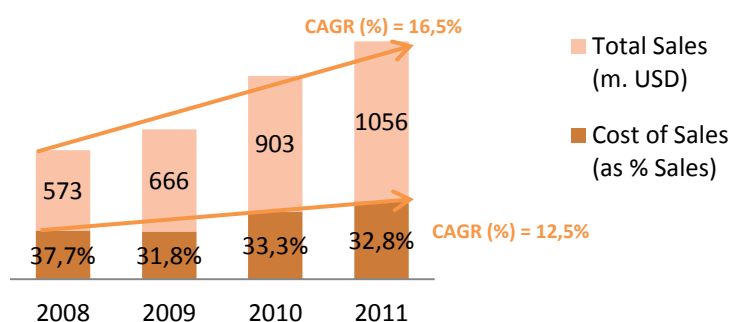


Fig.6 - Evolution of Sales and Cost of Sales

In Fig.5 one can simply deduce that the US market is the most important one for the company, representing 50% of total sales. Moreover, if we add up the UK and Rest of Europe markets, these will represent three quarters of total sales. Since 2008, total sales have been increasing (Fig.6), representing a CAGR of 16,5% for this period. Consequently, the total cost of sales also increased, but when analysing in relative terms, the cost of sales represent around 30% of total sales. In 2011, there was a slightly improvement in this ratio when comparing with 2010 (from 33,3% to 32,8% of sales).

3.3. Industry Review

Both companies' businesses belong to the healthcare sector, although in different industries. Roche's business is within the pharmaceuticals industry while Illumina has Life Science Tools as its core industry.

3.3.1. Pharmaceuticals

According to IMS Health, the world market for pharmaceuticals represented \$ 856 bn in 2010. This market has been growing for the past few years. Since 2003, the annual growth rate has been around 7%. Geographically, North America and Europe represent the largest markets, as it is possible to see in Fig.7, where these markets together represent more than 50% of the total market size.

Fig. 7 – Pharmaceuticals Market Size and growth estimates

Source: IMS Health Market Prognosis(Mar'11)

	2010 (bn USD)	Market Size by Region (%)	2006-2010 CAGR %	2011 % Growth (Estimate)	2011-2015 CAGR % (Estimate)
Total Market Size	\$ 856,4	-	6,2%	4 - 5%	3 - 6%
North America	\$ 334,7	39,1%	4,6%	2 - 3%	0 - 3%
Europe	\$ 245,3	28,6%	5,6%	2 - 3%	2 - 5%
Asia/Africa/Australia	\$ 126,5	14,8%	14,5%	12 - 13%	11 - 14%
Japan	\$ 96,5	11,3%	2,6%	5 - 6%	2 - 5%
Latin America	\$ 53,4	6,2%	12,1%	11 - 12%	11 - 14%

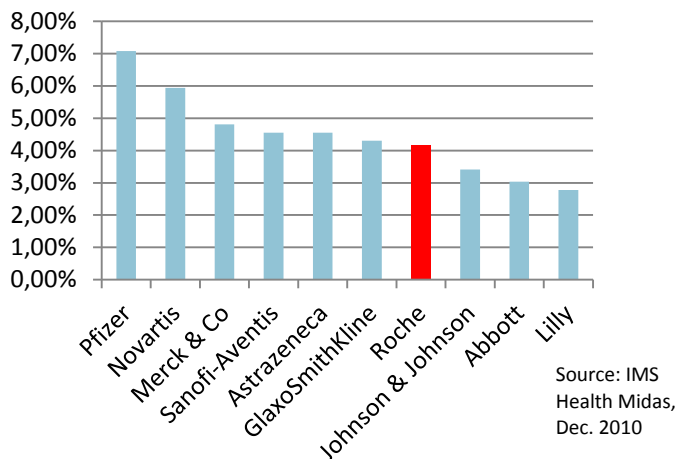


Fig.8 - Share of the Top 10 Pharmaceutical Companies in Total Sales

share. Actually, the Top 10 companies, in terms of sales, represent roughly 45% of total market share. Roche is positioned in 7th place having a 4,17% market share. In such a fragmented and competitive industry, it is important to understand what drives growth. There are several important factors worthy of mention:

- Exposure to Patent Expiration – loss of market exclusivity leads to higher competition and tougher commercial conditions. Therefore, patent expiration is a major issue for companies and it is necessary to have a forward looking approach to this fact, since it will have a negative impact for the companies losing their patent rights, declining revenues in the future.
- Expansion of Emerging Markets Portfolio – diversification into emerging markets is key to success, not only due to the growth potential of this ascending market but also to overcome patents expiration in western countries, along with the austerity measures that have slowed down the healthcare spending. The rise of a middle-class in emerging markets, with higher income levels, will allow families to spend more on healthcare and additionally governments can invest more in providing better health services and products. Therefore, companies should not miss out on this opportunity for growth.
- Barriers to Generic competition – with the expiration of patents, there is a fiercer competition from generic products. Nevertheless, the legal and regulatory requirements may delay the process, especially in areas related to biologics, respiratory devices and vaccines, creating higher barriers to entry. Thus, companies should analyse their portfolios in order to understand how generic products may affect their business.
- Value-creating innovation – investing in R&D does not immediately translate into new products. Achieving success in developing new medicines, passing through all the regulatory requirements and launching them in the market is what generates value. Thus, what is important is not the number of pipeline assets that a company has, but which of them can translate into value-added products.

Nevertheless, it is noteworthy to observe that for the past few years, the Asia/Africa/Australia and Latin American markets have experienced higher growth rates, this being a trend expected to continue in the future with predicted CAGR between 11% and 14% for these markets for the period 2011-2015.

The Pharmaceuticals industry is very fragmented. Pfizer's sales represent 7% of total sales and this is the company with higher market

Concerning the current economic situation, there are two other important factors to take into account, from the Government and Institutions perspectives and also from the patients perspectives. The austerity measures, translated in this case by Healthcare budget cuts, have an impact on R&D investment, expenditure on medicines and the purchase of state-of-the art technology for Health Institutions. On the other hand, there is an increasing elasticity of demand, since patients may have lower purchasing power and be more price-sensitive.

3.3.2. Life Science Tools

This industry is highly fragmented as it is possible to identify in Fig.9, although four major players can be distinguished by their higher market shares (Thermo Fisher Scientific, Quest Diagnostics, Agilent Technologies and

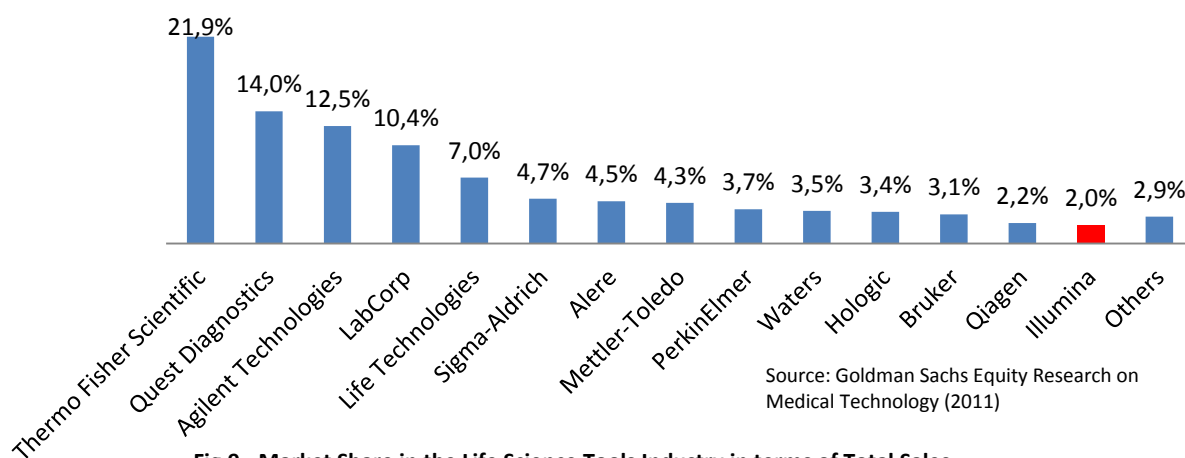
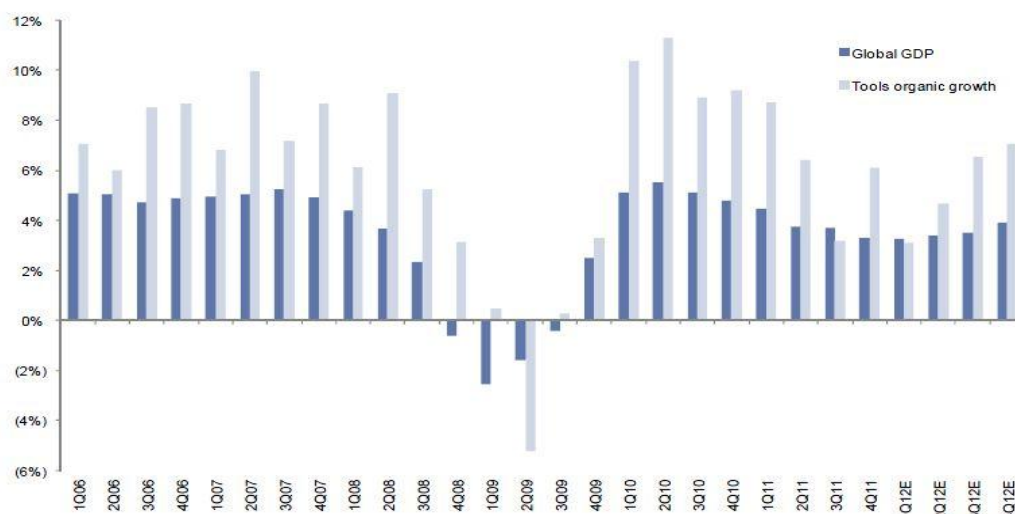


Fig.9 - Market Share in the Life Science Tools Industry in terms of Total Sales

LabCorp).

According to a Goldman Sachs Equity Research, Life Science Tools was the worst-performing industry in the healthcare sector, mostly due to the concerns around austerity measures that have impact on academic and government funding. Nevertheless, in 2012, this industry was the second best performer as these concerns are slightly fading away, as R&D funding recovers, and there is a positive expectation for future funding. In the US the debate still goes on regarding the budget for the National Institute of Health (the uncertainty will endure until a final decision is reached). However, in an election year, there is a higher likelihood for no or low cuts in the budget. In the EU, the funding has been quite stable in regions such as UK, Germany and Scandinavia. Finally, China is seen as a key country for the development of this industry as the government intends to increase its R&D investment (from 1,5% of GDP currently to 2,5% by 2020).

Similarly to the Pharmaceuticals industry, key growth drivers are related to government and academic spending in R&D, new products adoption (value-creating innovation), expansion into emerging markets (higher



Source: Goldman Sachs Equity Research on Life Science Tools and Diagnostics (2012)

Fig.10 – Comparison of Global GDP growth and Life Science Tools organic growth

growth perspectives) and pricing (important factor in a such fragmented market).

Moreover, Life Science Tools is a cyclical industry with a high correlation between its organic growth and global GDP growth ($R^2 = 73\%$ according to Goldman Sachs). Fig.10 shows the comparison between Global GDP growth and Life Science Tools growth and generally, the industry growth follows GDP growth, albeit with a higher degree of volatility. This makes total sense, as this industry, as well as the entire sector, relies so much on R&D spending, which is also cyclical alongside the market.

To conclude, there is on one hand, a mature and competitive market such as pharmaceuticals and on the other hand, a market highly fragmented, still developing and facing a downturn due to the dependence on R&D investments which have been affected by the government budget cuts for that purpose. After gaining some knowledge about the context, the following step is to proceed for the valuation of the companies and the deal itself.

4. Valuation

In this chapter, the quantitative analysis of the proposed deal will be addressed. The first step is to make a standalone valuation of the target company (Illumina) in order to reach a fair price of the company before accounting for any synergies from the merger. Since the announcement of the offer in January of 2012, the valuation of Illumina will be carried out as of December of 2011, i.e. a pre-bid date.

The same will apply for Roche's valuation, which will lead to the second step – the standalone valuation of the acquirer company. It is important to compute the fair price of Roche, so that one can arrive at the value of the merged entity. This step will comprise of two phases. In the first instance, both firms' values are summed up and subsequently, the synergies are incorporated into the valuation. The difference between these two values will infer the synergy value.

These valuations are based on the data available from the companies' reports obtained from their respective websites, Damodaran's and Reuters' websites and Equity Research studies from Goldman Sachs and Morgan Stanley.

4.1. Standalone Valuation of Illumina

In order to identify a price target for the firm, Illumina will be valued using the WACC method. Being a younger firm, Illumina is still in its growth phase, experiencing high volatility in relation to its margins. The decision to choose between a valuation method that uses FCFE or FCFF was relatively simple and is related to the fact that the company has no dividends distribution and there is no intention to do so in the forthcoming years. Also, its stock repurchases policy has been quite unstable throughout past years, which makes it difficult to set a trend and forecast future free cash flows to equity. Moreover, the company has been issuing convertible senior notes that give investors the option to convert their rights into shares. Thus, the FCFF approach will be considered.

In this section, the main assumptions regarding the forecast of Cash Flows will be addressed as well as the assumptions to compute the WACC value (rates and capital structure).

4.1.1. Main Assumptions

Sales Growth

This is, undoubtedly, the most important assumption to make, since the majority of figures will be forecasted based on a relationship with revenues. In the past few years, Illumina has faced a CAGR of 16,5%. However, assuming this average growth for the near future is misleading. Each launch of a new product boosts sales growth rate for a period of time and then this rate tends to decrease. Therefore, in order to sustain such a

high rate, Illumina would have to be launching new successful products every two years, which may be an excessively optimistic view.

According to a market forecast in the Biotechnology industry from BCC Research, a 13,6% CAGR for the global market is expected for the next years. Yahoo Finance presents a figure of 17,9% as the growth rate estimate for Illumina and a 13,5% growth for the industry. Nevertheless, one has to understand the challenges that Illumina will be facing, especially over the next two years. The Budget Control Act affects the funding for academic and government institutions. The National Institute of Health (NIH), one of the most preponderant clients is no exception. As 80% of Illumina's customer base is subject to these budget cuts, it may impact the firm's ability to meet the expected sales growth rates. Thus, one should consider a more conservative figure.

A research from Morgan Stanley assumes budget cuts of approximately 3,5% in 2012 and 5% in 2013. This will have impact on the US customer base. However, the management team assumes that Illumina will suffer no impact from these budget cuts, which is doubtful. In Europe, there may be some cuts as well but with a lesser impact, while in other regions, the reverse situation may occur whereby funding tends to increase, especially when it concerns healthcare-related government and academic institutions.

Other factors that may drive sales growth rates are the development and the launch of new lines, as well as the changes in the product mix. The MiSeq, launched in the third quarter of 2011, and HiSeq 2500 whose release to the market is expected to start in the second half of 2012 are new sequencing instruments that will allow the development of studies of the human genome in less time and at a lower cost, which will therefore be very appealing to the market. These products will drive down the Microarray business as they work as substitutes to those devices. With this change in the product mix, there will be a positive effect in the gross margin as the sequencing products have higher margins.

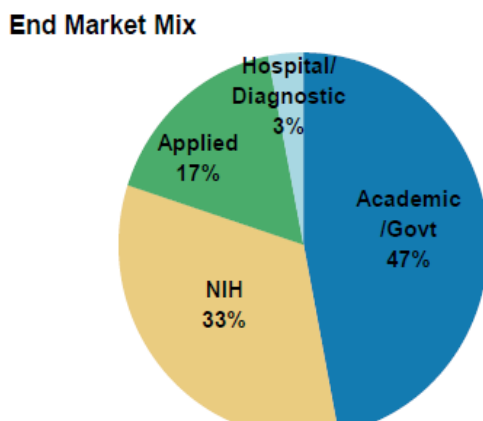


Fig.11 – End Market Mix of Illumina.
Source: Morgan Stanley Research

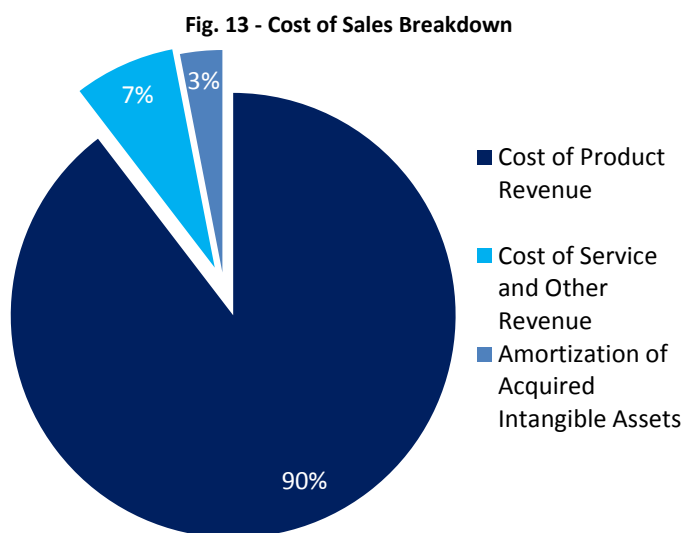
Taking all this information into consideration and the fact that the company does not provide any figures of sales breakdown per product or region, the most conservative estimate of 13,6% growth was taken as a basis and relying on the information provided by Morgan Stanley on the End Market Mix distribution of Illumina (Fig.11), a weighted average growth rate was computed for each year, accounting for the expected 3,5% and 5% budget cuts affecting the sales growth for the “Academic/Govt” and “NIH” customers (Fig.12). For the Terminal

Value, the average of the estimated periods' growth rates is assumed, leading to a value equal to 10,5%, defending the idea that the company will not have a high growth forever and when it reaches a certain maturity, lower growth rates will occur.

g (%)	Weights	2012	2013	2014	2015	2016
NIH and Govt	80%	10,1%	8,6%	9,6%	10,6%	10,5%
Others	20%	13,6%	13,6%	13,6%	13,6%	10,5%
Weighted Average		10,8%	9,6%	10,4%	11,2%	10,5%

Fig.12 – Sales growth rate assumptions for Illumina

Cost of Sales



For the past three years, the average ratio of cost of sales as a percentage of revenues was equal to 32,6%. On October 2011, the company implemented a restructuring plan with the objective of reducing workforce by 8% and consolidation of facilities. Besides the restructuring plan, the change in the product mix will lead to lower costs as sequencing products and its consumables have a lower production cost. When looking at the costs breakdown per category (Fig.13), it is fairly easy to deduct that

the production cost and the cost of buying the raw material for that production (cost of product revenue) represent the major bulk of this account. Although no target is specifically defined by the administration, a gradually 1,6% improvement in the cost of sales/sales ratio will be assumed, therefore, the target for 2016 will be 31%. As mentioned before, this improvement in the ratio will be progressive, thus it is expected that the major improvements will occur in the first years, implying a gross margin enhancement. Comparing the figures from 2011 with 2016, there is a 2% increase in the gross margin.

R&D

This account will be impacted by two distinct factors already mentioned above. On one hand, the restructuring plan and the acquired expertise will allow Illumina to invest less and maintain the performance. On the other hand, as this company is still at an early stage in its life cycle, the investment in R&D is essential and therefore a target of R&D expenses as 18% of sales is set against the past three years average figure of 19,8%.

Income Taxes

The management team states that the current figure for the tax rate will diminish in the following years, thus, from a conservative perspective a slight decrease of the tax rate to 34% will be assumed, less 0,6% than the average from the past three years.

Depreciation and Capital Expenditures

In order to forecast the values for Depreciation and Capital Expenditures (CAPEX), a ratio of those accounts over non-current assets of the previous year was calculated. The past years average led to the figures of 10,5% for Depreciation and 12,3% for CAPEX. In this phase, it is important to understand whether this value is reasonable for future forecasts. Given the fact that the company is still in its growth phase, the CAPEX rate has to be higher than the depreciation rate. As the company moves to the long-run, there are fewer investments and in a steady state situation, CAPEX is equal to depreciation as investments are to replace worn out capital stock.

Net Working Capital

Net Working Capital (NWC) for each year was calculated with the following formula:

$$NWC = \text{Accounts Receivable} + \text{Inventories} - \text{Accounts Payable} - \text{Cash}$$

Then, the changes in net working capital that figure in the Cash Flow Statement were calculated through:

$$\Delta NWC_t = NWC_t - NWC_{t-1}$$

Capital Structure

Although the management does not specifically mention the company's future perspectives regarding its capital structure, it is stated that the company has set up a hedge strategy on the convertible senior notes in order to avoid dilution and a consequent change in the capital structure. Therefore, it will be assumed that the company does not intend to change its D/E ratio. For the calculation of this ratio, Net Debt will be considered as *Long-term Debt + Short-term Debt – cash*. In Illumina's case, the value assumed as a target capital structure was D/E = 11,9%.

Discount Rates

For the DCF valuation, the weighted average cost of capital (WACC) should be calculated. As previously mentioned above, its formula is given by

$$WACC = \frac{D}{V} k_D (1 - \text{tax rate}) + \frac{E}{V} k_E$$

Therefore, some assumptions have to be made in order to reach an estimate. Taking into consideration the literature review, the cost of equity (k_E) was calculated using the CAPM method and the cost of debt (k_D) was calculated with Damodaran's ranking based on the interest coverage ratio of the company. The capital structure was already mentioned above. In order to reach those discount rates, the following data were used:

- Risk-free rate – the 10-years rate for the treasury bond of the US government as of 1st of December 2011 was considered as the riskless asset.
- Beta – Damodaran provides an unlevered beta for the biotechnology industry (Global) equal to 1,24. Reuters has a beta value specifically for the company (0,58), which is significantly lower than the figure presented by Damodaran. Since this is a more specific value, concerning Illumina individually, it was assumed that the Reuters value for beta should be used, as Damodaran's figure might be too generic. In order to obtain the levered beta for the company, the target D/E ratio was used.
- Equity Risk Premium (ERP) – Damodaran's estimate for the US was utilised. It is not considered a specific country risk premium. On one hand, the company is based in the US where it retains 50% of its customer base; on the other hand, Illumina has a diversified portfolio globally, which diminishes the international risk exposure to other countries as well.
- Cost of debt – the interest coverage ratio (EBIT/Interest Expenses) was calculated and a credit ranking was attributed to Illumina according to Damodaran's ranking. Illumina's debt is ranked with an A-, which implies a premium 1,65% over the risk-free rate, which implies a cost of debt equal to 3.76%.

Terminal Value

For the terminal value, the most difficult matter is to determine when this company will exit its growth phase. Assuming that in the future, when a company is in a stable phase, it does not surpass the economy's growth rate, a forecast for GDP growth from the Global Economic Outlook study by The Conference Board was taken into consideration. For the period of 2007-2025 the expected GDP growth for Advanced Economies and Emerging Markets and Developing Economies is 1,9% and 3,3% respectively. Using the current figure of sales breakdown by region as weights for an average growth, the assumed growth rate for the Terminal Value was assumed to be 2,24%.

4.1.2. Results

After assuming a conservative estimate in all instances, the valuation led to a final price per share of \$41,18, which compared to the share price of \$30,48 in the stock market on the 30th of December of 2011, represents 35,1% upside potential. This would lead to the conclusion that the shares may be undervalued in the market. One should bear in mind the fact that the main points of uncertainty are related to the R&D pipeline and the ability to launch successful new products, which, if the company continues to strive to grow through this strategy, there may be even higher upside potential. Accounting for the 139 million shares outstanding, the equity value for Illumina is \$5.721,88 mn (Appendix 3).

Sensitivity Analysis

In order to consider an interval for Illumina's Equity Value, a sensitivity analysis was performed by changing two variables – Operating Margin and Expected Growth for the Terminal Value. Changes were made regarding the results from the Base Case. A Bull and Bear perspective were assumed.

- Bull Case – Operating Margin is assumed to be 2,5% superior against the base case. For instance, for the last estimated year (2016) the operating margin will be 29% instead of base case's 26,5%. It considers that there will be a strong demand for Illumina's products and/or costs reductions will be even more effective. The terminal value growth rate adds 0,25% against the Base Case, assuming a higher impact of the superior growth rates from emerging markets.
- Bear Case – Operating Margin is assumed to have the inverse impact of the Bull Case, thus, being lower in 2,5% against the Bear Case. This case defends the eventuality that Illumina's products are rejected by the market and/or that there were no additional costs reductions resulting from the restructuring plan. For the terminal value growth rate, the Advanced Economies growth was assumed. This figure is equal to 1,9%.

Taking into consideration these two scenarios, Illumina's Share Price range from \$33,65 to \$48,99, representing an upside potential between 10,4% and 60,7% against the \$30,48 share price as of the 30th of December 2011.

Share Price Variation in the last year

The market share price for Illumina from 30th of December 2011 up until one year back, ranged from \$25,96 and \$77,88. The estimated prices fit within the range, but as there is a high volatility in the prices, there is no strong conclusion to take out of these figures.

Multiples Valuation

After defining a comparable peer group, the average and median multiples of Price/Sales, EV/Sales and EV/EBITDA were computed (Fig.14), including and excluding Illumina in the sample. The final result lead to share prices between \$14 and 31\$.

Nevertheless, it is important to take into account the specificity of this industry, where companies are not absolutely comparable. The core product/technology being sold is differentiated across companies and the growth expectations differ a lot as well. The company that, at each moment, is providing the state-of-the-art technology is the one that has the competitive advantage, being that reflected in the share price. Illumina has a unique technology that cannot be copied by competitors so far, and this may drive its price up in the market.

Fig.14 - Multiples Valuation for Illumina

Firm	Market Cap.	EV	Sales	EBITDA	Price/Sales	EV/Sales	EV/EBITDA
Illumina	3530,20	2947,50	1066,80	244,60	3,31	2,76	12,05
Luminex	894,00	780,30	177,70	20,10	5,03	4,39	38,82
Agilent	12096,90	11588,90	6615,00	768,00	1,83	1,75	15,09
Thermo Fisher	17253,30	18464,40	11373,40	2464,00	1,52	1,62	7,49
Qiagen	3207,40	3145,90	1121,30	331,30	2,86	2,81	9,50
Perkinelmer	2219,90	2226,10	1851,10	322,50	1,20	1,20	6,90
Life Technologies	7176,80	9397,30	3703,40	1154,90	1,94	2,54	8,14
Affymetrix	294,60	354,30	287,30	17,00	1,03	1,23	20,84
Average (inc. Illumina)					2,34	2,29	14,85
Median (inc. Illumina)					1,88	2,14	10,77
Average (exc. Illumina)					2,20	2,22	15,25
Median (exc. Illumina)					1,83	1,75	9,50

4.2. Standalone Valuation of Roche

A second step in this valuation chapter is to perform the valuation of the acquirer company so that, in a third stage, both companies' values are aggregated, enabling us to arrive at a merged entity, which will then incorporate the appropriate synergies of such deal. It is important to take into consideration that, in order to merge both companies, their income statement, balance sheet and cash flow statement must be as similar as possible, thus Roche statements will follow Illumina's and therefore, some accounts that were originally separated in the annual report, were grouped and renamed.

Roche has been following a stable dividend policy for the past years and, according to the annual report, it is the management's objective to maintain this strategy. Also, a stable D/E ratio was assumed and there is no

information regarding possible stock repurchases. In order to put into practice a different valuation model and since the conditions aforementioned make it possible, the DCF method using FCFE will be deployed.

Following the structure from Illumina’s valuation chapter, in the following section there will be an explanation of the main CF forecasting and discount rates assumptions.

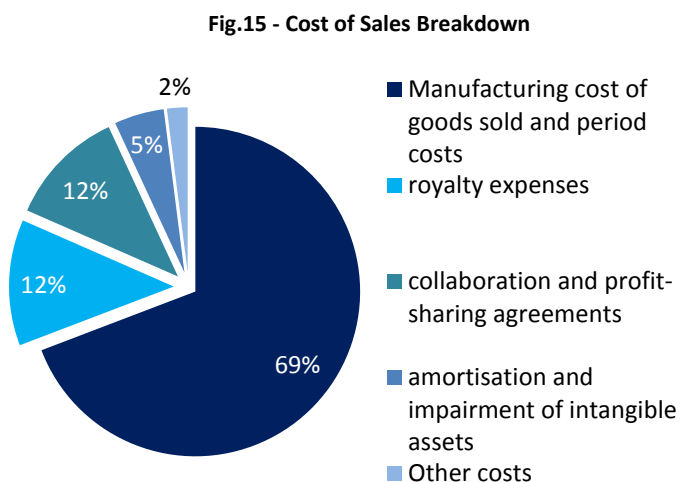
4.2.1. Main Assumptions

Sales Growth

When looking at the recent past, Roche’s sales have been declining. Although this is a tough market with fierce competition, the fact that drove sales down was the strengthening of the Swiss Franc against other currencies. If constant exchange rates are assumed, sales actually grew by 1% over the past year. The main problem here is the fact that Roche does not disclose detailed information regarding the origin of its sales. There is a split for sales between four regions for the pharmaceuticals division and three regions for the diagnostics division as it was shown in chapter 3. This considerably increases the difficulty of the forecasting analysis.

The rationale behind the assumptions made was broken into three different steps. At first, the breakdown of sales per region in each segment was taken into consideration and, for each region the corresponding growth expectation from IMS Health (see the industry analysis chapter) was applied. Then, a representative currency for each region was considered and the depreciation/appreciation to CHF for the past year was accounted to adjust the growth rate estimates. Finally, it was possible to arrive to a unique growth rate figure by a weighted average on the type of business. For further detail, the calculus of the growth rate is presented in Appendix 4.

Cost of Sales



Roche has been increasing its gross margin due to a lower ratio of cost of sales over sales. The “Excellence Program” implemented by the company allowed them to better allocate resources and save costs, and thus become more profitable. Fig.15 demonstrates the cost of sales breakdown per category. Not surprisingly, the manufacturing costs and the royalty expenses represent the major share in total cost of sales. With expiring royalty obligations, it is possible to improve these figures and reduce costs. The “other costs” figure has some costs related with the Japan earthquake. Being a

one-time cost, it is expected to vanish in the total costs for the following years. Moreover, the “Excellence Program” impacts the manufacturing costs and there is still room for improvements according to the management team. From 2009 to 2011, cost of sales as a percentage of sales have decreased 1% and a figure of 1% additional improvements will be assumed. Thus, for the forecasted period, cost of sales will be calculated as 26% of sales.

R&D

Although the “Excellence Program” also allowed some cost cutting in R&D, it is the management objective to maintain last years’ ratio of R&D expenses as percentage of sales, which was 19%. Thus, this will be the value to consider.

Income Taxes

There is no information regarding changes in the corporate tax rate the Roche will be paying in the future, therefore an average of previous years was computed and a 19,1% tax rate will be assumed.

Dividends

The Management Team was proud to announce that for the 25th consecutive year there was an increase of the dividends amount to be distributed. The payout ratio is quite stable as well and it is set to be 55,3%. For the terminal value, the current 3% growth in dividends will be assumed.

Depreciation and CAPEX and Net Working Capital

For these three accounts the same procedures were taken as in Illumina’s valuation. Nevertheless, it is noteworthy point related to the fact that the management team assumes a need for a higher investment in NWC in the short-term, mainly due to the fact that the clients in the south of Europe are taking longer to pay their accounts, due to the current crisis.

Capital Structure

As with Illumina, there is no information regarding the objective to maintain or change the D/E ratio. However, there is an intention to keep the current investment grade rating. A good assumption that will allow the company to pursue this goal is to maintain the current capital structure. Again, Net Debt will be used to compute the ratio. The capital structure assumed is given by $D/E = 14,50\%$.

Discount Rates

For the DCF valuation, using FCFE, it is necessary to calculate the cost of equity (r_e). In order to do so, the CAPM formula will be used and, as already stated in the literature review, it is given by:

$$E(R_i) = r_f + \beta_i[E(R_m) - r_f]$$

In order to arrive at an appropriate discount rate, the following data was assumed:

- Risk-free rate – the 10-year rate for the treasury bond of the Swiss government as of 1st of December 2011 was considered as the riskless asset.
- Beta – The unlevered beta for Roche provided by Reuters was assumed. This figure is equal to 0,71. Then, it was relevered, using the target D/E ratio. In order to obtain the levered beta for the company, the target D/E ratio was used and a levered beta of approximately 0,79 was estimated.
- Equity Risk Premium (ERP) – Damodaran's estimate was again considered. For the US, there is no specific country risk for Switzerland and thus the ERP figure was equal to 6,51%. Again, and as for Illumina, Roche's operations are well diversified globally and therefore no specific country risk premium should be added.

4.2.2. Results

The final equity value is CHF186.035 mn (Appendix 5). It represents a 37,6% upside potential against the market capitalization as of 30th of December 2011. It is important to keep in mind that the sales forecast may be subject to some biases. Nevertheless, the importance of this valuation is not to reach an exact value. Instead, it is important because it is a necessary intermediate step in order to make a valuation of the merged entity.

4.3. Merged Entity

Having both companies' respective valuations, the financials for the merged entity are now necessary. The first step is to use the same structure in the financial statements, which was already facilitated when some changes in the accounts were applied in Roche's valuation. Then, both firms' accounts can be added up to produce the first phase of the merged entity financials. The second step is to incorporate the synergies opportunities that can be exploited through of the deal. By the difference between the valuation result in the second and first steps, one can infer the total value of the synergies.

4.3.1. Roche and Illumina – Valuation of Both Businesses Together

Illumina and Roche were valued with different models, thus the first step is to value one of the firms with the other's model. As Roche also assumes a stable D/E ratio, a second valuation of this firm has to be performed using the WACC methodology.

WACC-based DCF valuation of Roche

The same assumptions as from the previous model were taken into account and the figures that were missing in order to calculate the discount rate, were computed with the same rationale as when Illumina's valuation was performed. For the terminal value, the GDP rationale was taken as basis, but one should bear in mind that Roche is in a more mature market and facing tougher competition. Moreover, the continuing expectations of CHF's appreciation against other currencies will also drive the company's value down in terms of CHF. Therefore, a 0,1% growth rate for the terminal value was assumed, taking into consideration a conservative perspective once again.

The result of the WACC valuation (Appendix 7) was similar to the one obtained with the FCFE method, accounting for a 0,05% upwards change in Equity Value. A reason for this change could be the fact that the leverage effect might drive the enterprise value up, especially in a case like Roche where the firm has a A+ rating and a low risk-free interest rate, leading to a cost of debt equal to 1,96%.

WACC for the Merged Entity

Having valued both businesses with the same model, the next step is to sum each company's accounts and discount the FCFF at a WACC for the merged entity. For the sake of simplicity, it will be assumed that both firms will keep their capital structure so that the merged entity's debt and equity values are simply the sum of each company's values. In order to do so, Illumina would have to be bought with 100% Roche's stocks or through a cash offer financed by new shares issued by Roche.

Fig.16 – WACC for the merged entity

	Illumina	Roche	Merged Entity
Shares Outstanding	139	849	988
Equity	4235	135161	139396
Net Debt	504	19605	20109
Rd	3,76%	1,96%	2,01%
Unlevered beta	0,58	0,71	0,71
D/V	11%	13%	13%
E/V	89%	87%	87%
D/E	12%	15%	14%
Tax Rate	34%	19%	19,45%
Levered beta	0,63	0,79	0,79
Rf	2,11%	0,66%	0,66%
ERP	6,51%	6,51%	6,51%
Re	6,18%	5,83%	5,79%
WACC	5,79%	5,29%	5,26%
g % for TV	2,24%	0,10%	0,16%

In Fig.16, a table shows how the WACC for the merged firm was determined. For the tax rate figure, one of the suggestions by the literature was to choose the higher of the two rates. Nevertheless, it should be noted that since there is a significant difference in both companies' tax rates and as Illumina represents only 2,5% of the net debt value of the merged entity, it may be a biased assumption to consider Illumina's rate of 34%, against Roche's 19%. An alternative may be to determine a tax rate weighted on the net debt values of each company, leading to a figure equal to 19,45%. The cost of debt (Rd) for the merged entity was determined as weighted average by net debt and the unlevered beta was calculated as a weighted average by Equity Value.

Finally, there is another change that needs to be made, regarding Cash Flows. As Illumina has its accounts in USD and Roche, on the other hand, reports in CHF, it is necessary to have both valued in the same currency, otherwise these figures cannot be aggregated. In order to do so, and taking into account the literature review, there are two different strategies to convert a firm's cash flow. As there is the need to merge the accounts, each cash flow of Illumina has to be converted in CHF at a forward exchange rate.

Results

Total Equity Value of the merged entity is equal to CHF 193.163,26 mn, which when compared to the sum of both businesses' equity value independently, there is a difference of 0,88% upwards (Fig.17). This may be due to the more favourable discount rate that drove the value of the Cash Flows slightly upwards.

Fig.17 - Comparison of Equity Values

Equity Illumina (USD)	\$	5.721,88
Equity Roche (CHF)	SFr.	186.121,04
Equity Merged Entity (CHF)	SFr.	193.163,26
Equity Sum of the Two (CHF)	SFr.	191.483,12
Difference		0,88%

4.3.2. Roche and Illumina – Accounting for Synergies

Having the figures for the merged entity, the synergies will be built in top of these. As has been the practice throughout this study, a conservative perspective will be present in every assumption made in this chapter, meaning that only well substantiated reasoning should be considered, avoiding speculative synergies. Nevertheless, one should avoid being excessively conservative as it may have such a negative impact on the deal to the point of questioning its viability. Above all, caution should be present in every assumption in order to avoid misinterpretations of the deal.

Regarding the cost cut programs in Illumina and Roche's operations above mentioned, these values are not considered as synergy since those improvements are related to an already existing efficiency program and are not connected to the deal itself. It is important to only consider as synergies the future improvements that are directly related with merging both firms. Failing to do so, may lead to an inaccurate valuation of the deal.

Recalling the Literature Review chapter, synergies can fall into two major groups: operating and financial synergies. Taking into account the reasoning of the deal, the focus of the synergies will be based on the operating part of it. There are two components affecting the operating margin – revenues in one side and costs on the other side, being both impacted by synergies when both companies merge.

Revenue Synergies

This is probably one of the most difficult synergy figures to estimate, as it relies upon certain assumptions that are extrinsic to the company, such as market's reaction towards a certain product or competition moves. An advantage today may no longer be relevant one month from now on.

The main purpose for this deal, as for Roche's perspective, is to be able to bring more information to the patients' diagnostics through the usage of the sequencing technology and targeting patients' needs much more efficiently. Providing personalised treatment is certainly something that customers will be willing to pay a premium over current prices. Therefore, the major impact will be on Roche's diagnostics' segment, where a 1,5% increase in prices will be assumed in the first two years, followed by smaller increments in the subsequent years as competition reacts to Roche's moves. It is important to mention that this additional growth is assumed to only

impact 24% of Roche's total sales each year, which corresponds to the diagnostics' segment weight on Roche's total sales as of 2011.

On Illumina's side, there are also opportunities for revenues growth, especially in the Sequencing business. As part of Roche's group it will confer much more visibility to the state-of-the-art Illumina's sequencing machines. This higher exposure will give a boost to MiSeq and HiSeq sales. Also, this deal will allow Illumina to enter deeper into new markets. Currently, the company has 50% of its sales across the US. Merging with Roche may lead to a higher penetration into European markets. It will be assumed a 1% impact upwards for the first two years. As well as in Roche's case, this impact will be faded towards the subsequent years, as there is always a higher peak when a new product is launched but then, those sales growth rates tend to stabilize. Furthermore, competition may launch similar products to compete with MiSeq and HiSeq. It is important to take into consideration as well that the deal will lead to a lower dependence on Government and Academic Spending and thus, there could be some benefits to be reaped, not in sales growth but in terms of less sales reduction due to decreasing levels of expenditure in these sectors.

The table presented in Fig.18 aggregates all the considerations above mentioned.

Fig.18 - Revenue Synergies Assumptions

	2012F	2013F	2014F	2015F	2016F
Merged Entity Revenues (mn CHF)	45165,36	45217,61	45294,83	45398,02	45507,51
Illumina's weight on sales	2,4%	2,6%	2,9%	3,2%	3,5%
Roche's weight on sales	97,6%	97,4%	97,1%	96,8%	96,5%
Sales growth for Illumina	1,0%	1,0%	0,7%	0,4%	0,2%
Sales growth for Roche	1,5%	1,5%	1,2%	1,2%	1,0%
Sales growth - synergies	0,4%	0,4%	0,3%	0,3%	0,2%

* This growth rate only impacts 24% of Roche's total sales, corresponding to the weight of the Diagnostics segment in total sales.

Cost Synergies

Usually these synergies are related to the optimisation of internal processes and reduction of common costs. These changes in the cost structure normally have the major impact in the first years after the deal, tending to zero in the long term, when the companies are totally integrated.

The most usual cost synergies are related with the General and Administration costs account, where the common costs arise. Administration and marketing costs can be reduced through headcount reductions. In the Roche & Illumina deal this also applies as there may be overlapping operations in some regions, especially in the US and Europe. Also, there can be some opportunities regarding products' distribution as an integrated logistic plan may lead to lower distribution costs. Nevertheless, this is not the main focus point for this merger, where revenue synergies are the main reason for the interest in this deal. It will be assumed that the integration of the aspects mentioned above will lead to a 0,05% cost cut for each estimation year. Regarding other markets, there

may be no cost reduction as emerging markets are the basis of most growth for the years to come. Therefore, there is no reason to reduce the investment in these regions.

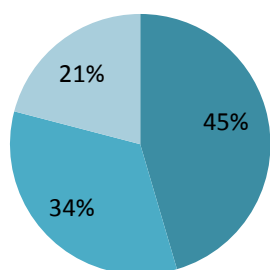
R&D expenses are assumed to have a 1% reduction in total value. One should recall that Roche intends to maintain a stable ratio of R&D investment as a percentage of sales, and therefore it is not expected an aggressive change in this account. Instead of its current 19% ratio, R&D will represent around 18,7% of sales. The 1% reduction represents a part of Roche's R&D investment in genome sequencing investigation that will be substituted by Illumina's technology. Also, it would be a substantial risk to divest in R&D in a merger, leading sometimes to the failure of such deals. Roche is making an offer to Illumina due to its innovative technologies and the ability to develop breakthrough products and tools. Therefore, restricting the ability to develop those technologies would be an untimely move.

Finally, regarding cost of sales, no reduction will be considered. A large proportion of this account is represented by the costs of buying the necessary materials to develop the firms' products and the production itself. As both companies' products are distinct, it will be assumed that its production costs will not be overlapped.

4.3.3. Inferring the Value of Synergies

Fig.19 - Synergies Breakdown

■ Revenue ■ R&D ■ G&A Costs



Having the firm value for the merged entity with and without synergies, one can infer the total amount of synergies by the difference between both values. In this case, the total amount of synergies is equal to CHF 3521 mn. Applying the synergies' assumptions mentioned above one at a time, it is possible to divide this total amount into three categories in order to understand the contribution of each assumption to the final value.

Looking at Fig.19, it is possible to conclude that Revenue Synergies have the largest impact. As the main reason for Roche to acquire Illumina is the opportunity to develop a customised product and being able to apply a higher price to its drugs and diagnostics products, it makes sense that revenues synergies have such an important position in the synergies breakdown. R&D synergies assume some importance as well, since buying Illumina's technology functions as a substitute for R&D investment.

4.3.4. Integration Costs

One important aspect to consider is the fact that there are costs in order to achieve synergies. Restructuring both companies and merging operations are processes that take a while and have some expenses

attached to it. One example is related with cost synergies through headcount reductions, which implies compensation fees to be paid.

These integration costs depend on the acquirer's ability to incorporate the target company and they occur during the first years after the deal takes place. In order to determine these costs, one can look for past deals and assess how much the acquirer has spent to integrate the target firm.

In 2009 Roche acquired Genentech and the integration costs were CHF 3.011 mn spread across the first two years after the deal. It represents 28,6% of Genentech's sales in the year before the deal. Applying this ratio in Illumina's sales as of 2011, one comes to a value equal to CHF 302 mn, which will be equally spread across the first two years of estimation (Appendix 10).

After taking into consideration these integration costs, it is possible to come up with figures for net synergies. In Fig.20 it is possible to assess the breakdown of synergies value by category, as well as the value of net synergies that include integration costs, which are relatively small when comparing with the accrued value from synergies, since integration costs only occur in the first years of the deal, while synergies hold for a longer period.

Fig.20 - Synergies breakdown by category

Synergies	Equity Value		Synergy (million CHF)
	Without Syn.	With Syn.	
Revenue	193163	194764	1600
R&D	193163	194347	1183
G&A Costs	193163	193900	737
Total Synergies			3521
Integration Costs	193163	192966	-197
Total Net Synergies			3324

5. The Acquisition

After developing the valuation of both companies and after determining the value of synergies, in this chapter it will be addressed how much should Roche offer to Illumina's shareholders and in which terms. There will be also a final comment on the execution risk of such deal.

5.1. How much should Roche pay?

Illumina's market capital is valued at \$5.722 mn, which represents a 35% upside potential regarding the market value by the end of 2011. Moreover, synergies estimates point to a figure around \$3.547 mn, which represents 84% of Illumina's market capital. At a first look, this could mean that Roche should be willing to pay a premium of 119% over market value by the 30th of December 2011. This would represent a maximum offer equal to \$66,71 per share.

Fig.21 - Relationship between Illumina's Premium and Offer Price

Illumina's Premium	
Market Cap. (Market Value)	\$ 4.235
Market Cap. (DCF Valuation)	\$ 5.722
Upside Potential	35%
Total Net Synergies	\$ 3.547
% Market Cap. (Market Value)	84%
Total Premium over Market Cap.	119%
Offer: max price/share	\$ 66,71

This would be a misleading conclusion however. Some additional aspects have to be taken into consideration when deciding which should be the final offer. Some of those matters will be analysed as follows.

Sharing Synergies Value

The value of synergies is created through the merge of both companies. The premium that comes from there should be divided between both firms' shareholders depending on how much each company is responsible for the existence of those synergies. It is important to evaluate the uniqueness of synergies, i.e. if one of the firms were not involved in the deal, would it still be possible to achieve such synergies?

Fig.22 - Illumina's Contribution for Synergies' creation

Synergies	Value	Illumina's Share	Synergy for Illumina
Revenue	\$ 1.708	80%	\$ 1.366
R&D	\$ 1.263	70%	\$ 884
G&A Costs	\$ 787	0%	\$ -
Total	\$ 3.757	60%	\$ 2.250
Integration Costs			\$ -126
Total Net Synergies			\$ 2.124
% Market Cap of Illumina			50%

Fig.22 identifies Illumina's contribution for Synergies' creation. Regarding revenues, Illumina should reap the major stake of the synergies, since it has the technology that will allow Roche to develop the personalised medicines. R&D reduction will mostly happen on Roche's side. However, it is only possible due to the incorporation of Illumina's know-how in biotechnology. At last instance, if Roche does not acquire Illumina, it will have to put more effort in R&D investments, trying to develop a technology similar to the one of Illumina. On the other hand, G&A cost reductions are mainly related to Roche as it is the one who has the bigger structure built and ready to be used and incorporate Illumina's operations, thus Illumina does not really have an uniqueness factor in this part of synergies as it would happen likewise with another company.

As a conclusion, Illumina's shareholders should only capture 60% of synergies' value added. Also, this percentage of integration costs should be carried by Illumina.

With this process, the total premium over Illumina's Market Capital is 50% against the previously figure of 84%. This means that the maximum Roche would be willing to pay per share is \$56,47 (Fig.23).

Fig.23 - Final Offer for the Acquisition

(in USD)	
Market Cap. (Market Value)	\$ 4.235 mn
Market Cap. (DCF Valuation)	\$ 5.722 mn
Upside Potential	35%
Synergies Value Added for Roche	\$ 2.124 mn
% Market Cap. (Market Value)	50%
Total Premium over Market Cap.	85%
Offer Price	\$ 56,47

The total premium over market capital may seem excessive. However, if we consider the average share price of Illumina of the six months before the deal (\$43,05), the total premium would only represent 55% of the firm's market capital, which seems to be a more reasonable figure (Appendix 11).

Target Shareholders

It is important to analyse the type of shareholders and if they are willing to sell the company where they have their stake. Illumina's major shareholders are Investment Banks, Investment Funds and Venture Capitalists. Usually, these investors intend to have an exit strategy that may pass through the sale of their stakes for a significant premium, thus they may not create a barrier to the deal. However, if the offer price is not perceived as fair, those shareholders will reject it, expecting that the company will deliver higher returns simply by its organic growth.

Method of payment

As mentioned in the literature review, there are two methods of payment in M&A deals:

- Equity financed transactions, i.e. paying with stocks. This tends to signal overpriced stocks, which, apparently, is not Roche's case. Also, paying with stock means that target shareholders will capture risk and synergies from the deal, which in one hand signals uncertainty about the successfulness of the deal and, on the other hand, if there is such certainty, it is not the wisest decision to share those gains.
- Cash offers. Usually it represents the acquirer's confidence in the deal. Also, as there may be new debt issuances, there is a superior pressure to achieve the proposed synergies.

It seems that it is at utmost interest of Roche to acquire Illumina with a cash offer, since, as seen before, most of the synergies shall be captured by Roche's shareholders and there is a high likelihood for the synergies to materialise. Also, Roche's stocks seem to be underpriced, which acts as another factor to avoid the Equity financed transaction.

5.2. Structure of the Final Offer

Taking into account all the previous considerations, the final offer should stand around \$56,47 per share, which would represent a 85% (35% for the fair value plus 50% for the synergies) premium over Illumina's market cap as of the 30th of December 2011. Roche should finance its offer with 100% cash as the new entity is capable to support additional leverage and Roche's shareholders would capture most of the synergies from the deal. In order to assess whether Roche can finance its offer with 100% cash, it is necessary to evaluate the debt capacity for the merged entity. Fig.23 shows the total of additional debt that Roche can commit to, maintaining its investment grade rating (a minimum BBB rating).

Fig.24 – Debt Capacity for the new entity

(mn USD)	Illumina	Roche	Merged Entity	BBB Requirements	Merged Entity with additional leverage
Cash	303	4.113	4.416		4.416
Net Debt	504	20.920	21.424		43.424
EBITDA	269	16.884	17.153		17.153
Net Interest Costs	24	2.773	2.797		5.670
EBIT	200	14.357	14.557		14.557
Interest Coverage	8,3	5,2	5,2	> 2,5	2,6
Net Debt/EBITDA	1,9	1,2	1,2	< 4,0	2,5
<i>USD/CHF = 0,9371</i>				Additional Debt	22.000

With the suggested offer price, the deal totals \$7.846 mn, which is way below the additional debt that Roche can acquire. Therefore, it is possible to finance the deal with 100% cash.

5.3. Execution Risk

In every deal, there are some risks that should be considered. This is an important issue, especially for Roche that will make an enormous investment into buying Illumina and if most of the value added will be captured by its shareholders, so does the risk.

For this deal to be successful, Roche should approach Illumina with a fair offer for the acquisition. Failing to do and both companies may not reach an agreement, at the same time that competition may prepare a move to acquire Illumina with a better offer.

Once the deal is closed, the main risk is related with the integration of operations as there is a mix of different cultures and business practices. One of the premises for cost synergies is related with headcount reductions. It is normal that most of the dismissed workers will be from Illumina and this may demotivate other workers from this company. Also, if Roche forces its culture into Illumina, the second may lose the creational spirit that allowed them to innovate and develop its existing products. Moreover, there may be different compensation systems for employees and it is necessary to come to a common ground where both parts will not feel harm by corporate changes.

Mostly, it is important to move quickly in order to avoid competition, make ascertained decisions and integrate teams and different cultures in a process as smooth as possible.

6. Conclusion

This dissertation addressed M&A concepts with two approaches. Firstly, a broad analysis of Literature was developed in order to present the most important notions about this topic. Secondly, this theory was applied in a real case – Roche’s attempt to acquire Illumina. Both companies were valued, as well as the possible merged entity and its synergies. Finally, a target price was suggested along with the financing of the deal.

Roche has an immense interest in acquiring Illumina as this company developed a state of the art product that is able to analyse the human genome in a fast and accurate way. It is at Roche’s interest to take advantage of this technology and developed drugs that are customised to each patient accordingly to his/her DNA, being thus more efficient. This would give Roche a strong competitive advantage over competitors and it would allow the company to apply a premium in current prices for its medicines.

Although Illumina is a small firm in the biotechnology industry, it is an important player as other firms cannot compete with its technology yet. Therefore, Illumina’s growth opportunities are large and there are very good perspectives for its future.

Roche made its first offer to acquire Illumina at \$44,5 per share in January of 2012, which was immediately rejected by Illumina’s Board. In fact, shares price in the market were around \$55 by the end of January, reinforcing Roche inability to be successful with the deal. By the end of March, the Swiss pharmaceutical raised the offer price to \$51 per share, which kept being rejected by the Board. Although investors believed that if Roche walked away from the deal, Illumina’s would be valued between \$38 and \$42¹, it was also a consensus that a possible merger could compensate them with a higher premium.

Roche seemed to walk away from the deal until last December when it made a final offer of \$66 per share, which was once again rejected as Illumina asked for \$75 per share. It is still uncertain whether the deal will materialise as Roche seemed to have given up definitely.

Nevertheless, the most important conclusion to take out of this dissertation is how to develop the valuation of a potential deal, identifying the gains and risks from it and clarifying how they are shared among investors of both entities. The rationale behind company valuation is complex and there is not a consensus about the most accurate model or the most reliable assumptions. Although it is impossible to guess the future, one can come to a reasonable proxy of an interval of what should be a fair value.

¹ <http://www.reuters.com/article/2012/04/18/us-illumina-roche-idUSBRE83H0RP20120418> (18th of April 2012)

7. Appendix

1. Illumina's Income Statement

<i>Illumina's Consolidated Income Statement for the Year Ended (in millions of USD)</i>								
	2009	2010	2011	2012F	2013F	2014F	2015F	2016F
Sales	666	903	1.056	1.170	1.282	1.416	1.574	1.740
<i>g%</i>		35,6%	16,9%	10,8%	9,6%	10,4%	11,2%	10,5%
Cost of Sales	212	301	346	377	408	446	491	539
<i>% sales</i>	31,8%	33,3%	32,8%	32,2%	31,8%	31,5%	31,2%	31,0%
Gross Profit	454	602	710	793	875	970	1.083	1.200
Research and Development	141	178	197	215	235	258	285	313
<i>% sales</i>	21,2%	19,7%	18,7%	18,4%	18,3%	18,2%	18,1%	18,0%
General and Administration Costs	176	220	262	287	314	347	386	426
<i>% sales</i>	26,4%	24,4%	24,8%	24,7%	24,7%	24,6%	24,6%	24,5%
Headquarter Relocation Expense	0	0	42	25	0	0	0	0
Restructuring charges	0	0	8	14	0	0	0	0
Acquisition related expense (gain), net	11	(9)	1	0	0	0	0	0
Operating Profit (EBIT)	126	213	200	252	326	365	412	461
Operating Margin	18,9%	23,6%	18,9%	21,6%	25,4%	25,8%	26,2%	26,5%
Interest Income	11	8	7	8	8	9	9	10
Interest Expense	(24)	(25)	(35)	(63)	(69)	(70)	(71)	(72)
Other (expense) income, net	1	(10)	(39)	(5)	0	0	0	0
Profit Before Taxes	114	186	133	192	265	304	351	399
Income Taxes	42	60	46	65	90	103	119	136
<i>Implicit tax rate</i>	36,8%	32,3%	34,6%	34,0%	34,0%	34,0%	34,0%	34,0%
Net Income	72	126	87	127	175	201	232	263

2. Illumina's Balance Sheet

<i>Illumina's Consolidated Balance Sheet for the Year Ended (in millions of USD)</i>								
	2009	2010	2011	2012F	2013F	2014F	2015F	2016F
Non-current Assets								
Property, Plan and Equipment	117	130	143	177	195	215	239	264
Goodwill and Other Assets	331	451	508	576	632	697	775	857
Total Non-Current Assets	448	581	651	754	826	912	1.014	1.121
Current Assets								
Cash and Cash Equivalents	145	249	303	304	334	368	410	453
Accounts Receivable	158	166	174	228	250	276	307	340
Inventories	93	142	129	163	179	198	220	243
Other Current Assets	586	702	938	993	1.088	1.201	1.336	1.476
Total Current Assets	982	1.259	1.544	1.689	1.851	2.044	2.273	2.511
Total Assets	1.430	1.840	2.195	2.443	2.677	2.956	3.287	3.632
Non-current Liabilities								
Long-term Debt	0	0	807	807	807	807	807	807
Other non-current Liabilities	125	107	76	147	162	178	198	219
Total Non-Current Liabilities	125	107	883	954	969	985	1.005	1.026
Current Liabilities								
Accounts Payable	53	67	50	78	86	95	106	117
Accrued Liabilities	98	156	187	194	212	235	261	288
Long-term Debt, current portion	290	312	0	0	0	0	0	0
Total Current Liabilities	441	535	237	272	298	329	366	405
Total Liabilities	566	642	1.120	1.227	1.267	1.315	1.372	1.431
Net Assets	864	1.198	1.075	1.216	1.410	1.641	1.915	2.201
Equity								
Common Equity	864	1.198	1.075	1.216	1.410	1.641	1.915	2.201
Total Equity	864	1.198	1.075	1.216	1.410	1.641	1.915	2.201

3. Illumina's Cash Flow Statement and FCFF Valuation

<i>Illumina's Cash Flow Statement (in millions of USD)</i>						
	<i>2012F</i>	<i>2013F</i>	<i>2014F</i>	<i>2015F</i>	<i>2016F</i>	<i>TV</i>
Operating Profit (EBIT)	252	326	365	412	461	461
<i>Tax Rate</i>	<i>34%</i>	<i>34%</i>	<i>34%</i>	<i>34%</i>	<i>34%</i>	<i>34%</i>
Depreciation	68	79	87	96	107	107
Capex	80	93	102	112	125	107
Changes Working Capital	60	30	36	42	44	44
FCFF	94	171	191	214	242	266
PV	89,31	153,22	161,03	170,48	182,59	5646,22
NPV	6402,86					
<i>% of NPV</i>	<i>0,01</i>	<i>0,02</i>	<i>0,03</i>	<i>0,03</i>	<i>0,03</i>	<i>0,88</i>
Outstanding Shares	139 million					
E/V	89,4%					
Equity Value	\$	5.721,88				
Price per Share	\$	41,18				
Market Share Price	\$	30,48				
Upside Potential		35,1%				

4. Sales Growth Assumptions for Roche

Per Region and type of business and accounting for Swiss Franc appreciation/depreciation

Pharmaceuticals	77%	g (%)	Currencies	% change (2011/2010)	Weighted Average	-0,1%	Weighted Average by type of business	-0,1%
US	37%	1%	USD/CHF	1,1%	by Region			
Western Europe	25%	3%	EUR/CHF	-3,2%				
Japan	12%	2%	JPY/CHF	6,1%				
International	26%	12%	BRL/CHF	-2,9%				
Diagnostics	23%	g (%)	Currencies	% change (2011/2010)	Weighted Average	-0,2%		
EMEA	50%	7%	EUR/CHF	-3,2%	by Region			
North America	18%	1%	USD/CHF	1,1%				
Rest of the World	32%	12%	BRL/CHF	-2,9%				

Currencies	2010	2011	% Change
USD/CHF	0,93	0,94	1,1%
EUR/CHF	1,25	1,21	-3,2%
JPY/CHF	0,0115	0,0122	6,1%
BRL/CHF	0,561	0,545	-2,9%

5. Roche Income Statement and FCFE valuation

<i>Roche Group's Consolidated Income Statement for the Year Ended 31st December (in millions of CHF)</i>								
	2009	2010	2011	2012F	2013F	2014F	2015F	2016F
Sales	51.151	49.167	44.113	44.069	44.025	43.981	43.937	43.893
g%		-3,9%	-10,3%	-0,1%	-0,1%	-0,1%	-0,1%	-0,1%
Cost of Sales	14.615	13.293	11.942	11.458	11.446	11.435	11.424	11.412
% sales	28,6%	27,0%	27,1%					
Gross Profit	36.536	35.874	32.171	32.611	32.578	32.546	32.513	32.481
Research and Development	9.874	10.026	8.326	8.373	8.365	8.356	8.348	8.340
% sales	19,3%	20,4%	18,9%					
General and Administration Costs	14.385	12.362	10.391	10.400	10.390	10.379	10.369	10.359
% sales	28,1%	25,1%	23,6%	23,4%	23,3%	23,2%	23,1%	23,0%
Operating Profit (EBIT)	12.277	13.486	13.454	13.838	13.824	13.810	13.796	13.782
Operating Margin	24,0%	27,4%	30,5%	31,4%	31,4%	31,4%	31,4%	31,4%
Associated Companies	0	(3)	12	12	12	12	12	12
Interest Income	554	557	647	589	589	588	587	587
Interest Expenses	(2.599)	(2.829)	(2.228)	(2.015)	(1.805)	(1.464)	(1.356)	(1.210)
Profit Before Taxes	10.232	11.211	11.885	12.424	12.619	12.946	13.039	13.171
Income Taxes	1.722	2.320	2.341	2.370	2.407	2.469	2.487	2.512
Implicit tax rate	16,8%	20,7%	19,7%	19,1%	19,1%	19,1%	19,1%	19,1%
Net Income	8.510	8.891	9.544	10.054	10.212	10.477	10.552	10.659
Payout Ratio				55,3%	55,3%	55,3%	55,3%	55,3%
Dividends				5.560	5.647	5.794	5.835	5.895
					2%	3%	1%	1%
Dividends growth for TV	3%							
Rf	0,66%							
ERP	6,51%							
Levered Beta	0,79							
Re	5,83%							
Present Value				5253,89	5042,44	4888,15	4652,27	166198,52
Sum of PV	186035,3							
Shares Outstanding	849							
Price	219,12							
Market Share Price	159,2							
Upside Potential	37,6%							

6. Roche's Balance Sheet

<i>Roche Group's Consolidated Balance Sheet for the Year Ended 31st December (in millions of CHF)</i>								
	2009	2010	2011	2012F	2013F	2014F	2015F	2016F
Non-current Assets								
Property, Plan and Equipment	17.697	16.729	16.201	15.475	15.460	15.444	15.429	15.414
Goodwill and Other Assets	18.389	16.679	17.143	15.973	15.957	15.941	15.925	15.909
Total Non-Current Assets	36.086	33.408	33.344	31.448	31.417	31.385	31.354	31.322
Current Assets								
Cash and Cash Equivalents	2.442	1.841	3.854	2.535	2.532	2.530	2.527	2.525
Accounts Receivable	10.461	9.403	9.799	10.577	10.126	9.676	9.227	9.040
Inventories	5.648	4.972	5.060	4.792	4.788	4.783	4.778	4.773
Other Current Assets	19.928	11.396	9.519	12.298	12.285	12.273	12.261	12.248
Total Current Assets	38.479	27.612	28.232	30.201	29.731	29.261	28.793	28.587
Total Assets	74.565	61.020	61.576	61.649	61.147	60.647	60.147	59.909
Non-current Liabilities								
Long-term Debt	36.143	27.857	23.459	21.261	16.037	14.392	12.148	8.798
Other non-current Liabilities	6.941	6.523	7.425	6.415	6.408	6.402	6.396	6.389
Total Non-Current Liabilities	43.084	34.380	30.884	27.676	22.445	20.794	18.544	15.187
Current Liabilities								
Accounts Payable	2.300	2.068	2.053	1.962	1.960	1.958	1.956	1.954
Accrued and other Current Liabilities	19.767	12.910	14.157	14.248	14.234	14.220	14.205	14.191
Total Current Liabilities	22.067	14.978	16.210	16.210	16.194	16.178	16.162	16.145
Total Liabilities	65.151	49.358	47.094	43.886	38.639	36.972	34.705	31.333
Net Assets	9.414	11.662	14.482	17.764	22.508	23.675	25.441	28.577
Equity								
Common Equity	9.414	11.662	14.482	17.764	22.508	23.675	25.441	28.577
Total Equity	9.414	11.662	14.482	17.764	22.508	23.675	25.441	28.577

7. Roche's Cash Flow Statement and FCFF Valuation

<i>Roche's Cash Flow Statement (in millions of CHF)</i>						
	<i>2012F</i>	<i>2013F</i>	<i>2014F</i>	<i>2015F</i>	<i>2016F</i>	<i>TV</i>
Operating Profit (EBIT)	13838	13824	13810	13796	13782	13782
<i>Tax Rate</i>	<i>19%</i>	<i>19%</i>	<i>19%</i>	<i>19%</i>	<i>19%</i>	<i>19%</i>
Depreciation	2361	2227	2224	2222	2220	
Capex	3181	3000	2997	2994	2991	
Changes Working Capital	1920	-451	-450	-449	-187	-187
FCFF	8458	10864	10853	10842	10569	11352
PV	8032,56	9799,97	9297,86	8821,47	8167,19	168998,75
NPV	213118					
<i>% of NPV</i>	<i>3,8%</i>	<i>4,6%</i>	<i>4,4%</i>	<i>4,1%</i>	<i>3,8%</i>	<i>79,3%</i>
Outstanding Shares	849 millions					
E/V	87,33%					
Price per Share	219,22					
Market Share Price	159,20					
Upside Potential	37,7%					

8. Merged Entity Income Statement

<i>Merged Entity's Income Statement for the Year Ended (in millions of CHF)</i>					
	<i>2012F</i>	<i>2013F</i>	<i>2014F</i>	<i>2015F</i>	<i>2016F</i>
<i>Exchange Rate (USD/CHF)</i>	0,9371	0,9301	0,9282	0,9282	0,9282
Sales	45165	45218	45295	45398	45508
Cost of Sales	11811	11826	11849	11879	11913
Gross Profit	33354	33392	33446	33519	33595
Research and Development	8575	8583	8596	8612	8630
General and Administration Costs	10669	10682	10701	10727	10754
Headquarter Relocation Expense	23	0	0	0	0
Restructuring charges	13	0	0	0	0
Operating Profit (EBIT)	14074	14127	14149	14179	14210
Operating Margin	31,16%	31,24%	31,24%	31,23%	31,23%
Associated Companies	12	12	12	12	12
Interest Income	597	596	596	596	596
Interest Expense	-2074	-1869	-1529	-1422	-1277
Other (expense) income, net	-5	0	0	0	0
Profit Before Taxes	12604	12865	13228	13365	13542
Income Taxes	2451	2502	2573	2599	2634
Net Income	10153	10363	10655	10766	10908

9. Merged Entity Cash Flow Statement – Without Synergies

<i>Merged Entity's Cash Flow Statement (in millions of CHF) - Without Synergies</i>						
	<i>2012F</i>	<i>2013F</i>	<i>2014F</i>	<i>2015F</i>	<i>2016F</i>	<i>TV</i>
<i>Exchange Rate (USD/CHF)</i>	0,9371	0,9301	0,9282	0,9282	0,9282	0,9282
Operating Profit (EBIT)	14074	14127	14149	14179	14210	14210
<i>Tax Rate</i>	<i>19%</i>	<i>19%</i>	<i>19%</i>	<i>19%</i>	<i>19%</i>	<i>19%</i>
Depreciation	2425	2300	2305	2311	2319	2319
Capex	3256	3087	3092	3098	3107	2319
Changes Working Capital	1977	-423	-417	-410	-146	-146
FCFF	8529	11016	11028	11044	10804	11611
PV	8102,19	9941,92	9454,53	8995,03	8359,40	176175,63
NPV	221029					
<i>% of NPV</i>	<i>0,04</i>	<i>0,04</i>	<i>0,04</i>	<i>0,04</i>	<i>0,04</i>	<i>0,80</i>
Outstanding Shares	988	million				
E/V	87%					
Equity Value	193163,26					
Price per Share	195,52					

10. Merged Entity Cash Flow Statement – With Synergies

<i>Merged Entity's Cash Flow Statement (in millions of CHF) - With Synergies</i>						
	2012F	2013F	2014F	2015F	2016F	TV
Exchange Rate (USD/CHF)	0,9371	0,9301	0,9282	0,9282	0,9282	0,9282
Sales	45335	45388	45431	45530	45616	45616
Cost of Sales	11811	11826	11849	11879	11913	11913
Gross Profit	33524	33562	33582	33651	33703	33703
Research and Development	8489	8497	8510	8526	8544	8544
General and Administration Costs	10616	10629	10648	10673	10701	10701
Headquarter Relocation Expense	23	0	0	0	0	0
Restructuring charges	13	0	0	0	0	0
Integration Costs	151	151	0	0	0	0
Operating Profit (EBIT)	14232	14285	14424	14451	14459	14459
Operating Margin	31,39%	31,47%	31,75%	31,74%	31,70%	31,70%
<i>Tax Rate</i>	<i>19%</i>	<i>19%</i>	<i>19%</i>	<i>19%</i>	<i>19%</i>	<i>19%</i>
Depreciation	2425	2300	2305	2311	2319	2319
Capex	3256	3087	3092	3098	3107	2319
Changes Working Capital	1977	-423	-417	-410	-146	-146
FCFF	8656	11144	11249	11263	11004	11812
PV	8222,90	10057,29	9644,67	9173,57	8514,38	179219,59
NPV	224832					
<i>% of NPV</i>	<i>0,04</i>	<i>0,04</i>	<i>0,04</i>	<i>0,04</i>	<i>0,04</i>	<i>0,80</i>
Outstanding Shares	988	million				
E/V	87%					
Equity Value	196487,42					
Price per Share	198,89					

11. Final Offer for the Acquisition – premium compared to 6months average share price of Illumina

Illumina's Premium	
Market Cap. (Market Value)	\$ 5.981
Market Cap. (DCF Valuation)	\$ 5.722
Upside Potential	-4%
Total Net Synergies	\$ 3.547
% Market Cap. (Market Value)	59%
Total Premium over Market Cap.	55%
Offer: max price/share	\$ 66,71

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